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A job success rating scale was developed by use with 60 mentally retarded young adults (IQ's under 80, ages from 18 to 30), their parents, and employers. Interviews and job histories were analyzed; an experimental test battery measuring 101 aptitude and personality variables was administered. By factor analysis and statistical procedures, 17 tests were selected to compose the Laradon Occupational Success Predictive Battery. Cross validation was conducted with the group of 60 and a group of 51 with three subgroups. Analysis of predictive power indicated that in the subgroup most resembling the original 60, the predicted job success tended to correlate with the rated job success; female subjects were rated low; institutionalized retarded persons were not within the predictive scope; and the economic life of the community influenced what kind of job exposure the retarded person could have. Methods for perceptual remediation were also developed and tested on normal children (ages 5 to 17) and mentally retarded trainees at the Laradon Center. Results indicated that the mentally retarded showed more deviation in inconsistency measures than in accuracy. The tests are appended. (JD)

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THE OCCUPATIONAL SUCCESS OF THE RETARDED: CRITICAL FACTORS, PREDICTIVE TESTS AND REMEDIAL TECHNIQUES

LARADON HALL OCCUPATIONAL CENTER
East Fifty-first Avenue and Lincoln Street
Denver, Colorado 80216
October 1966

This investigation was supported, in part, by a research grant, number 987, from the Vocational Rehabilitation Administration, Department of Health, Education, and Welfare, Washington, D.C. 20201.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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**Erratum: the first and second figures in chapter eight were both mistakenly labeled figure 8-1.

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OCCUPATIONAL SUCCESS OF THE RETARDED: CRITICAL FACTORS, PREDICTIVE TESTS AND REMEDIAL TECHNIQUES

CHAPTER I

INTRODUCTION

The purpose of this project was to develop better methods of evaluating and training mentally retarded young adults for jobs through a better understanding of critical performance and behavioral factors. We proposed to do this by:

1. Determining how mentally retarded young adults who are successfully employed differ in performance and behavior from those who have been unable to hold a job.
2. Develop a battery of tests from the above information which would indicate: (a) whether or not a retarded young adult is ready for general employment, (b) if he is not ready, what specific areas of functioning need to be strengthened and how much.
3. Developing training and therapeutic techniques for remedial use in these critical areas of functioning to more efficiently prepare retarded young adults for employment.

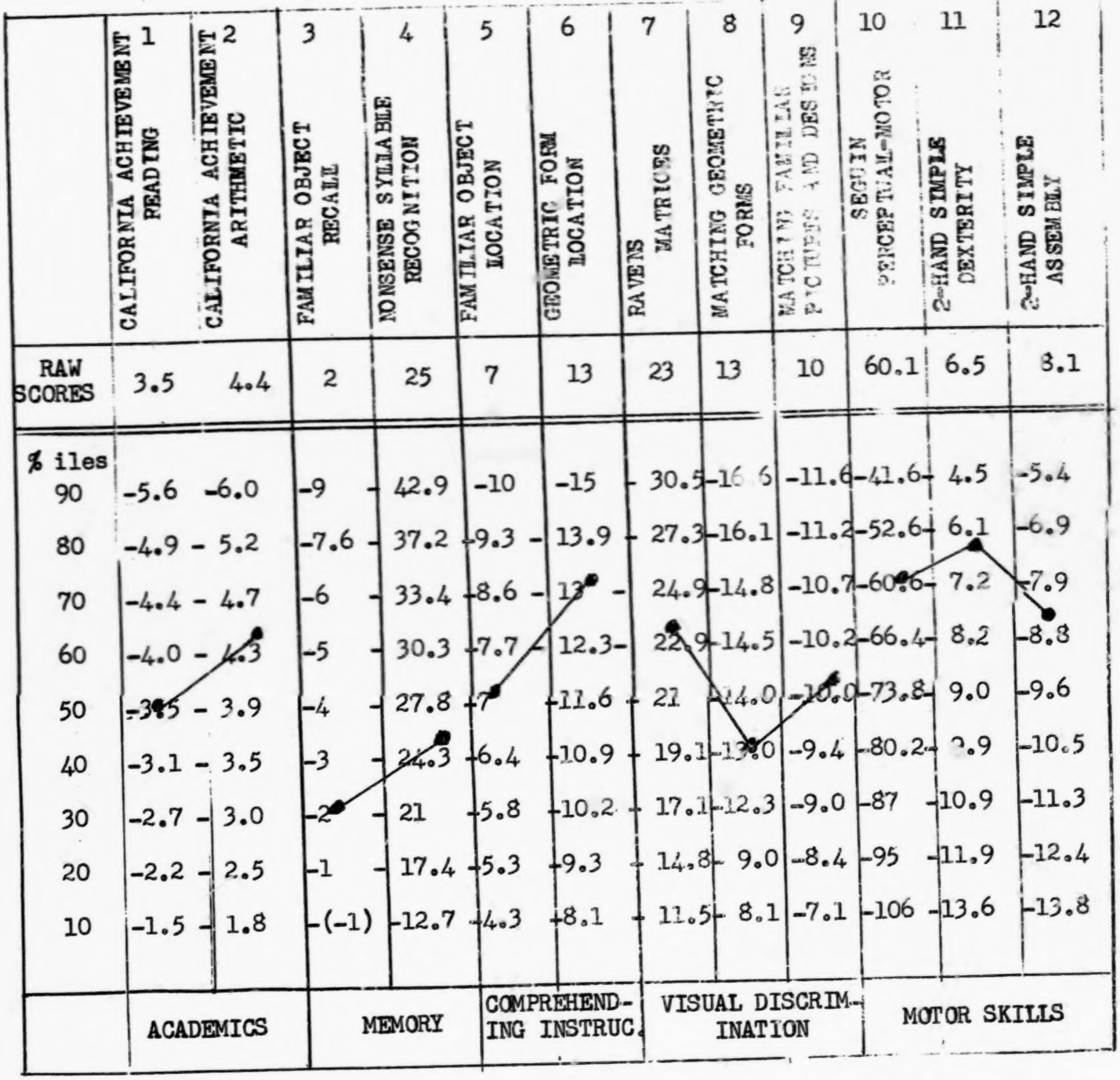
Although this research began formally in 1962 it actually was a logical extension of activities which were begun in 1959. At that time the Laradon Hall Occupational Center was established with the assistance of the Office of Vocational Rehabilitation as a Demonstration Project (RD-357).

The Laradon Hall Occupational Center experienced rapid growth similar to that of many other centers around the country. It has tripled in physical size, and quadrupled in number of clients served. Wages paid to trainees have increased thirty times and currently an average of one client per week is placed on a job as compared to the two trainees who were competitively employed during the first year of operation. Despite this progress it was the feeling of the Center staff in 1962, and continues to be the feeling of the staff, that we still fail to successfully habilitate too many youngsters who came to our program. We attribute this failure to our lack of knowledge of the relative contribution of various job related skills to successful employment. In addition, although we provide the best training situation our resources will allow, we do not know which aspects of our training are most important and need greater emphasis and which aspects deserve less attention.

The nature of this problem becomes more clear when the evaluation and training techniques used at Laradon Hall Occupational Center are examined in some detail, since Laradon is probably fairly representative of other training centers in respect to these two factors.

Specifically, lets examine the evaluation and training techniques used at the Laradon Hall Occupational Center. The evaluation procedures and materials are fairly conventional and generally resemble those used by other centers. Initially, a psychologist administers the Wechsler Adult Intelligence Scale, the Rorschach, the Thematic Apperception Test, the Bender Gestalt, and the Draw-a-Family. A psychiatrist, physician and social worker evaluate such things as the home environment, mental and physical health of the client. School records and previous employment, if any, are considered. Then an eight week evaluation begins consisting of job tryouts and further testing in five areas: academics, memory comprehending instruction, verbal discrimination, and motor skills.

A sample profile sheet is shown below.



	1 CALIFORNIA ACHIEVEMENT READING	2 CALIFORNIA ACHIEVEMENT ARITHMETIC	3 FAMILIAR OBJECT RECALL	4 NONSENSE SYLLABLE RECOGNITION	5 FAMILIAR OBJECT LOCATION	6 GEOMETRIC FORM LOCATION	7 RAVENS MATRICES	8 MATCHING GEOMETRIC FORMS	9 MATCHING FAMILIAR PICTURES AND DESIGNS	10 SEGUIN PERCEPTUAL-MOTOR	11 2-HAND SIMPLE DEXTERITY	12 2-HAND SIMPLE ASSEMBLY
RAW SCORES	3.5	4.4	2	25	7	13	23	13	10	60.1	6.5	8.1
% iles 90	-5.6	-6.0	-9	42.9	-10	-15	30.5	-16.6	-11.6	-41.6	4.5	-5.4
80	-4.9	5.2	-7.6	37.2	-9.3	13.9	27.3	-16.1	-11.2	-52.6	6.1	-6.9
70	-4.4	4.7	-6	33.4	-8.6	13	24.9	-14.8	-10.7	-60.6	7.2	-7.9
60	-4.0	4.3	-5	30.3	-7.7	12.3	22.9	-14.5	-10.2	-66.4	8.2	-8.8
50	-3.5	3.9	-4	27.8	-7	-11.6	21	-14.0	-10.0	-73.8	9.0	-9.6
40	-3.1	3.5	-3	24.3	-6.4	-10.9	19.1	-13.0	-9.4	-80.2	9.9	-10.5
30	-2.7	3.0	-2	21	-5.8	-10.2	17.1	-12.3	-9.0	-87	10.9	-11.3
20	-2.2	2.5	-1	17.4	-5.3	-9.3	14.8	9.0	-8.4	-95	11.9	-12.4
10	-1.5	1.8	-(-1)	-12.7	-4.3	-8.1	11.5	8.1	-7.1	-106	13.6	-13.8
	ACADEMICS		MEMORY		COMPREHENDING INSTRUC.		VISUAL DISCRIMINATION			MOTOR SKILLS		

Figure 1-1. Percentile ratings based on fifty Laradon Hall trainees.

In addition, monetary concepts, time concepts, and the client's ability to fill out a job application, use a telephone and time clock are tested. Finally, the subject's motivation, maturity, congeniality, reaction to criticism and supervision, ego-involvement in work, hostility, goal concepts, initiative and frustration tolerance are rated and evaluated by the staff.

What does all this mean? It means we have a fairly good idea of how the client compares to those who have preceded him through the Center in certain areas which have been tested such as academic achievement. It also means that we have a pretty good idea of how he behaves in the Center, and how well he did certain work tasks which were assigned to him. Is the client ready for placement on a competitive job? Should the client participate in some training at the Center first? In what, and for how long? Does he need therapy? For what?

Frequently, the subject is assessed as having a number of deficient aptitude areas and/or personality weaknesses. After all he has been referred to the Center because he is mentally retarded and because he has been unable to get or hold a job. Are some of these deficient areas more critical in terms of eventual job success than others? Do we try to treat or strengthen all these areas? How do you do this, or how can you best do this? Are there some critical factors which prevent this client from being successfully employed which have not been uncovered?

In the majority of cases the client begins a period of training in the Center's contract workshop. The client is expected to learn how to work satisfactorily by working, with special attention given to his individual differences as indicated by the evaluation.

Preparing a retarded client for employment by training and having him work on contract work is a widely used technique. There are many arguments to recommend it. One of the most important, probably, is the development of self-worth in the youngster. He achieves and he is paid. Yet at best, this must be considered a "shotgun" type of approach to the problem. And, in the case of the Laradon Hall Occupational Center, when this technique is coupled with other forms of training, counselling and therapy, approximately 50% of the clients are still not competitively employed when they complete their training and leave the Center. This 50%, or less, figure of successes is a common one in the progress reports of sheltered workshops or occupational centers for the retarded.

Why specifically did some trainees benefit more from the training? Why did some become successful and others fail?

Several years ago the Metropolitan Council for Community Services conducted a survey in Denver to determine how many of the retarded in the Metropolitan area were receiving services. This survey disclosed that approximately only 25% of the mentally retarded in the Denver Metropolitan area (based on 3% of the total population) were receiving any kind of services. Or, to put it another way, that only 25% of the mentally retarded in the Denver area could be located. If these missing retardates were not in the public school system, in the private schools, in the State institutions, in sheltered workshops, etc., where were they? One suggestion was that most were being kept at home. For those missing retardates over 16, at least, our staff felt that a more reasonable explanation was that they had lost their identity, were employed and had been absorbed into the community life. The experiences of our staff, in interviewing dozens of employers, and the fact that hundreds of parents of retarded young adults would not participate in our research study for fear that their son or daughter might be identified or reidentified as being retarded, would seem to support this point of view. A question this raises, of course, is how are the many retarded young adults who apparently went directly to jobs, who did not require special job training for the retarded, different from those retarded young adults who are referred to Centers such as ours.

From all of this, what our staff concluded, along with others I'm sure, is there are retardates, and then there are retardates. That there are important differences between retardates that we do not know about that explain why one youngster can be successfully employed, and another with a similar full scale I.Q. score, and similar academic achievement level, simply cannot make it. If these critical differences could be uncovered, evaluation techniques constructed to identify them, and means found to remediate them, we would no longer have to depend on educated guess and "shotgun" methods currently being employed in the field.

CHAPTER II

THE PROJECT PLAN

The steps to be followed in developing better methods for evaluating and training mentally retarded young adults were as follows:

1. Locate a minimum population of sixty retarded young adults in the community who have had employment experience and met our other sample criteria.
2. Construct an investigative battery of tests which would cover a wide range of aptitude and emotional variables.
3. Construct a scale for rating the actual degree of occupational success of the subjects.
4. Interview the sixty subjects along with their parents and employers, so that the subjects level of occupational success can be rated on the job success rating scale.
5. Test all of the subjects on all of the items in the experimental test battery.
6. Statistically analyze the data which had been obtained. The analysis would include both simple regression and factoral analysis.
7. Construct an occupational success predictive battery from the information derived from the statistical analysis.
8. Cross-validate the occupational success predictive battery.
9. Develop specific remediative techniques.

CHAPTER III

SAMPLE

Formal criteria for subjects for the research population was as follows:

1. That the subject had had some employment experience and had been available for employment for a minimum of at least one year.
2. That the subject had never resided in a state institution for the mentally retarded.
3. That there were no major physical defects.
4. That the subject's full scale I.Q. score on the Wechsler Adult Intelligence Scale did not exceed 80.
5. That the subject was more than 18 years of age but not over 30.
6. If the subject had a seizure history that the seizures were under medical control.

The following procedures were used in developing the research population:

1. Names and addresses of possible subjects were obtained from the public schools, and other Denver Metropolitan area agencies.
2. A form letter was sent to the home address informing the subject and the parents that the research project was asking their cooperation. A form to be filled out, and a self-addressed envelope were enclosed. A copy of this form letter is included in the appendix.
3. A follow-up phone contact was made by the psychiatric social worker to answer any questions and encourage participation.

4. If the parents or subject were willing to participate in the research an appointment was made for the social worker to visit the subject and the parents in the home.
5. During this interview the social worker asked a series of standard questions to determine whether or not the subject met our criteria. During this interview, or during a second interview, when necessary, questions were also asked to obtain part of the information for the job success rating scales.
6. If the subject met the research criteria as far as could be determined an appointment was made for the first test session. The subject could either come to the Center or, if it was more convenient for him, come to a designated public school facility. If the subject was employed during the day an evening or weekend appointment was made.
7. The first test given the subject at the initial test session was the Wechsler Adult Intelligence Scale. If the subject achieved a full scale I.Q. score of over 80, he was thanked for his time and terminated from the study. If the subject's full scale I.Q. score was 80 or less, testing continued. At the completion of the first testing session, the subject was scheduled for the second session of testing.
8. Each subject was assigned a code number, and all further information and test results were identified only by this number.
9. The subject's name was added to a list of names of those subjects whose employer or employers were to be interviewed so that further information could be obtained for the job success rating scales.

10. An interviewer contacted the subject's employer or employers and asked a series of standard questions. No mention of mental retardation was made by the interviewer.

11. After the third and final test session, the subject was paid $4.00 and thanked for his participation. (He was paid $1.00 for his first session, and nothing for the second session.)

Obtaining subjects for the project was far more difficult than we originally anticipated. Prior to submitting our research proposal, we had checked with the various school districts in the Denver Metropolitan area and with other agencies as to the availability of subjects. We were assured that they would cooperate and provide us with the names of potential subjects, which they did. However, as we were to find out there is a great deal of difference between having the name and address of a possible subject and actually having him participate in the research study.

The first list we obtained from the Public Schools contained 236 names and addresses. Of these 236, 80 indicated willingness to participate in the research study. The remaining 156 were either unwilling to participate in the research or could not be located. From the 80, only 21 could be used. A breakdown of the remaining 59 shows:

12 were eliminated because of inadequate job experience;

9 had three or more appointments made for testing but never appeared;

8 did not appear for their first appointment and when contacted said they were no longer interested;

8 were eliminated because of having attended institutions at some time;

6 completed the first test session but refused to return;

4 could not be used because their full scale I.Q.s were over 80;

12 were unavailable at the times for testing for such reasons as moving out of town, being in jail, or expecting a baby.

A number of the 21 who did complete the battery would not have done so had the staff not furnished transportation to and from the test sessions.

The next two lists of potential subjects for the research which were obtained from Public School Districts contained 217 names and addresses. Of these 217 retardates, only 41 were cooperative, and only 14 were finally used. Thus, we were able to obtain a total of only 35 subjects from the first 452 names, or less than one in ten who were contacted.

At this point it became obvious that we would be fortunate to reach our minimum goal of 60 subjects, much less our preferred goal of from 100 to 120 subjects. It was also decided at this time to utilize subjects who had, at one time or another, attended Laradon Hall School. We had hoped to avoid doing this because several of these subjects had also attended the Laradon Hall Occupational Center and were known by research staff members. One major advantage to using some of the Laradon Hall students was that from the information in their files, only those subjects who met our criteria could be selected. Also, it was felt that because of the rapport which had been established between these former students, their parents and our agency, that a higher degree of cooperativeness would exist. This proved to be true. All of the former Laradon Hall students cooperated in the research study as indicated in the first of the following two tables which describe the contribution of retarded subjects by different agencies and the age and full scale I.Q. scores of the research population.

Table 3-1

Contribution of Retarded Subjects by Different Referral Agencies

Referral Source	Original Number	Number located and willing to participate	Criteria rejection or dropped out	Completed testing
Div. of Voc. Rehab.	24	5	2	3
Denver County Public Schools	236	80	59	21
Jefferson County School Dist.	110	25	16	9
Adams County School District	107	16	11	5
Laradon Hall	20	20	0	20
Retarded Children's Center	5	5	3	2
Totals	502	151	91	60

Distribution of subjects according to variables of age and I.Q. are as follows:

Table 3-2

	Age	#	WAIS FS IQ	#
	18	6	Below 50	2
	19	12	50-54	0
	20	11	55-59	7
	21	8	60-64	8
	22	6	65-69	13
	23	6	70-74	14
	24	4	75-80	16
	25	6		
	26	1		
Total		60		60
Mean FS I.Q.			69.3	
Mean Age	20.9 yrs.			

It is obvious from the preceding discussion that a great deal of difficulty was encountered in developing a population for this study. Although there were many reasons for this such as subjects having moved from their last known address or not wanting to endure nine hours of testing, the major cause of difficulty was the fear of the parents of these retarded young adults that they might be identified or reidentified as being mentally retarded. They did not wish their sons or daughters to be tested by members of an agency which is known primarily as serving the mentally retarded even if testing was carried out in a public school facility, and particularly, they did not want the employer of their son or daughter to be contacted, even though assurances were given that no mention to the employer would be made of the person being mentally retarded or handicapped in any way. As one parent put it, "We are grateful for what has been done for our son, but he is doing just fine and we don't want to do anything which might change things."

Incidentally, this feeling by many parents that their sons or daughters have been able to lose their identity of being mentally retarded would certainly seem to be supported by the experiences of our staff members in interviewing employers. If any of the employers of the sixty subjects used in this study had any suspicion or inkling that there was anything different about these employees they did not indicate it to the interviewers. In fact, some employers talked in quite glowing terms about the employees, and about such things as possible future promotions.

CHAPTER IV

THE JOB SUCCESS RATING SCALE

Constructing a valid job success rating scale for the project subjects or even developing a definition of job success that has meaning is an extremely difficult task. The pitfall, of course, is over-simplification, that is, considering only one aspect of job success. For example, length of employment is often used as a gauge for measuring job success. Someone who has spent three months on a job and is still employed is considered to be a job success or occupationally successful. One who has failed to last three months on a job is considered to be a job failure or occupationally unsuccessful. This sort of arbitrariness, of course, results in such things as a person, who worked four months and was fired because of his actions or lack of actions, being considered more successful than the person who loses his job after two months because the company goes out of business. It would also rate a person who worked three months for a highly competitive business, run by strangers, equal to a person who had worked three months for his father in a highly protective setting.

The job success rating scale for this project was developed by the following steps:

a. listing the variables which we felt might be involved in job success;

b. scaling each variable;

c. demonstrating a high inter-judge rating using these variables;

d. weighting these variables according to their relative value in determining job success;

e. revising this weighting after we had become familiar with the job histories of a number of subjects.

The following are a partial list of factors which were felt to contribute something to the meaning of job success:

1. Longevity or length of time on the job.
2. Size and stability of the employer.
3. Pay scale.
4. Degree of protectiveness or competitiveness in the employment situation.
5. Skills and effort required of the employee to perform his job.
6. Fringe benefits of the job.
7. Employee satisfaction with the job.
8. Adequacy of the employee's relations with co-workers.
9. Satisfaction of the employer with the employee.
10. Reason for termination of employment. (General lay-off versus inadequate performance.)
11. Initiative on the job.
12. Appearance.
13. Job regularity.
14. How the job was located.

These variables were then scaled on a 0 to 10 continuum with appropriate adjectives at different points.

NAME______________________________**JUDGE**______________________________

	0	1	2	3	4	5	6	7	8	9	10
Pay scale/40 hrs.	0	$8	$16	$24	$32	$40	$48	$56	$64	$80	$80+
Job Length (months)	0	½	1	3	6	12	18	24	36	48	48+
Production	Failing		Improving adequately				Production OK		Better than expected		
Cooperativeness	Insubordinate			Hostile	Passive resister				OK	Enthusiastic	
Initiative	Supervis.,necessary			Needs help with routine			Can follow routine some initiative			Good initiative	
Sociability	Distracting & distractable				Immature				Relates meaningfully		
Appearance	Dirty		Sloppy		Clean small wardrobe		Neat			Very neat	
Job Protective.	Very protective		Overlooks much			Understanding			Average competitive	Very comp.	
Job Regularity	Seasonal		Frequent layoffs				Occasional layoffs			Constant	
Employer Stabil.	Small company Unsympathetic personnel policies			Large co.			Small co. Sympathetic policies			Large co.	
How job located?	Parent initiative no client init.			some client		some parent some client		Good client initiative		Little parent	
Type of work skills	Simple Physical		Machine		Complex Dexterity			Reading writing		Judgment	
Termin. reason	Circumstantial			Client circumstances			Client's work or attitude		Client's work & attitude		
What S. liked?	Co-worker & socialization				Work conditions			Pay	Job perf. & Job nature		
What S. disliked?		"				"		"		"	"

Figure 4-1. Judges' Ratings of Interview Material.

The information obtained by the social worker in interviewing the parents and subject, and the information obtained by the investigator in interviewing the employers of the first 10 subjects was given to three judges. The judges were a rehabilitation counselor, a social worker, and the project director. The purpose of ranking this data was to determine if high inter-judge agreement could be achieved in this fashion. If it could not, it might indicate the information being obtained by the interviewers was inadequate, that the scaling intervals were incorrectly indicated, or that different criteria were being used by the judges.

The inter-judged correlation, as determined by the Spearman rho were statistically significant. From this we concluded that adequate data was probably in adequately interpretable form and that the judges tended to agree significantly overall.

The next step was to analyze the data that was actually derived from the job histories of all of the subjects who were tested with the experimental battery. This could be done without contaminating biases being introduced between the testing results and the job success data because the testing and job success inquiry had been done by separate people and the subjects'job histories had been coded so that the subjects' histories were anonymous.

The correlations in the following correlation matrix were derived from Spearman rho computations. Seven of the original 14 variables are not included in this correlation because of various reasons such as inadequate variance in the pilot study.

Table 4-1

Intercorrelations Among Some of the Variables Felt of Significant Value in Vocational Performance

	1	2	3	4	5	6	7	8
1. Reason for Termination and Job Length		62	81	10	41	26	21	36
2. Reason for Termination	62		38	16	27	20	06	18
3. Job Length	81	38		36	30	08	34	39
4. Pay	10	16	36		31	22	-03	12
5. Production	41	27	30	31		40	53	21
6. Cooperation	26	20	08	22	40		27	33
7. Initiative	21	06	34	-03	53	27		53
8. Sociability	36	18	39	12	21	33	53	

Further statistical analyses were oriented toward determining if job success could be thought of as a unidimensional trait from this data or whether it would be multidimensional. The statistical technique we employed in this was an orthogonal factor analysis. While we knew we would get a number of factors we thought we could gain some insight into the dimensionality problem by determining how many of the factors the production and job length variables were loaded on. Production and job length were selected as gross indices of job success for this occasion as we felt they were unquestionably related to it, whereas others might or might not be so clearly involved, and we were very sure we were interested in predicting production and job length in the final analysis. The results of this factor analysis are given in Table 4-2.

Table 4-2

Orthogonal Factor Loadings of 8 Job Success Variables

		Factors						
		1	2	3	4	5	6	7
1.	Reason for Termination and Job Length	81	-43	-23	-13	-02	-25	-11
2.	Termination Reason	59	-50	-01	-44	06	44	11
3.	Job Length	78	-36	-17	39	-06	-24	14
4.	Pay	38	-15	77	46	08	14	05
5.	Production	68	29	29	-16	-53	03	-27
6.	Cooperation	51	39	39	-45	37	-29	13
7.	Initiative	58	62	-30	12	-25	14	28
8.	Sociability	62	35	-30	24	50	20	-25

Without getting involved in factor interpretation beyond what our data would justify, it might be adequate to simply observe that Factor 1 and Factor 2 had significant loadings on both job length and job production. Factor 2 in the opposite direction, that is job lengths related to poor job production. Also, it was felt that while productivity and job length might define the most important type of success in a gross sense, that the factor analysis suggested that another factor of job length and sociability might exist.

Hand orthogonal rotations were done to see if we could differentiate a sociability factor as distinct from a productivity factor. Using rough regression equations (the square of the factor loadings) to derive factor scores for each subject. The ensuing scores then were correlated by Spearman rho. In all rotations that were tried the correlations came out to .6 or greater between a sociability factor and a productivity factor. It was thus thought that on the basis of this data significant differentiation could not be demonstrated.

Assuming that up to this point unidimensionality had been strongly suggested, we proceeded onto the task of combining the scales into a single job success index.

The first index was a general one involving reason for termination, length of employment, production, cooperativeness, initiative, and sociability ratings added together. This was called "Job Success Rating Index - A." It was thought it would be helpful to have an empirical check so we had one of our judges rank all the subjects according to his personal judgment. It should be noted that he loaded the pay variable, whereas none of the statistically derived indexes did so. This personal judgment index is referred to as "Job Success Index - B." A third index was derived from the job length variable using a regression equation. An innovation was introduced here, that of weighting all of the variable scores except job length which was added at unit weight. This index was called "Job Success Index -C."

These three criteria were compared and analyzed and the intercorrelations in Table 4-3 indicate Job Success Index C came out better. We were still troubled by the relativity of the correlational values and decided to continue searching for a more construct validated criterion. Particularly, we were concerned with the obvious injustices which resulted from not giving some consideration to the protectiveness of the individual's employment.

We decided that possibly a sequential combination of three scales might furnish us a better alternative. Three scales - degree of protectiveness, reason for termination, and length of employment were utilized in appropriate sequential combination. This combination was as follows: The subjects who attained only a protective rating on the protectiveness competitiveness dimension received that score as his total Job Success Score. Those who rated in the competitive section of the scale became eligible to be rated on the reason for termination scale and the addition of this score. The highest score on the reason for termination scale indicated that the subject was currently employed. Then he became eligible to be rated on the length of employment scale and the addition of that score. Thus, a subject who had only worked in a protective setting could never attain a total Job Success Index of over 5. A subject who had worked in competitive employment but who was not currently employed could not attain a total score of over 19. A subject who was currently competitively employed could reach the maximum total score on the Job Success Index score of 30. This Job Success Index is referred to as "Job Success Index - D."

Table 4-3 below indicates the intercorrelations between various combinations of vocational success indices, and includes the regression scores for productivity and sociability.

Table 4-3

Intercorrelations Between Various Combination of Vocational Success Indices

	Job Success					
	A	B	C	D	Prod.	Soc.
Job Success A		63	77	50	43	39
Job Success B	63		61	65	42	34
Job Success C	77	61		74	73	52
Job Success D	50	65	74		68	58
Productivity	43	42	73	68		81
Sociability	39	34	52	58	81	

The criteria used in this study was the Job Success Index D rated on the subject's most recent job. Below is a reproduction of Job Success Index-D.

JOB PROTECTIVENESS:

0	1	2	3	4	5	6	7	8	9	10
Undemandingly Protective		Overlooks Much		Understanding		Tolerantly Competitive		Average Normal Competitive		Very Competitive

Rating on Job Protectiveness ______
(if less than 6 ignore following scales)

REASON FOR TERMINATION:

0	1	2	3	4	5	6	7	8	9	10
	Subject's Work AND Attitude		Subject's Work OR Attitude		Circumstantial (Subject)			Circumstantial (Employer)		Currentl Employed

Rating on Reason For Termination ______
(if less than 10 ignore following scale)

JOB LENGTH:

0	1	2	3	4	5	6	7	8	9	10
0	¼	1	3	6	12	18	24	36	48	48+

(Scale on bottom in months)

Rating on Job Length ______

Subject's total Job Success Score ______

The procedure which was followed in arriving at the Job Success Index rating score for each subject was that a judge was provided with two forms containing the information obtained by the social worker from the parent interview and the investigator who interviewed the employer. From this information he rated each subject as previously described.

The questions asked on both the parent and employer interview forms are listed below.

QUESTIONS TO BE ASKED OF THE CLIENT AND/OR PARENT

1. What was your beginning salary?
2. How much are you now earning?
3. When did you begin working on the job?
4. How did you happen to find this job?
5. Please tell what you do on this particular job?
6. How do you feel you are doing on the job?
7. How do you like working with the people on the job? (probe if indicated)
8. Do you have any particular difficulty with anything on your job?
9. Why did you leave your job? (if terminated)
10. Do you feel that there are somethings on your job with which you need some help? If so, describe.

QUESTIONS TO BE ASKED OF THE EMPLOYER

1. When did____________________begin working with your company?
2. How long has he been employed with your company, or was employed?
3. What was ____________________beginning salary? If presently employed, what is he earning now?
4. How was he referred to you for the job?
5. How do you feel he is doing on the job?
6. How much supervision do you feel he requires, if any?
7. Does he show ability to take initiative to do more than what is asked of him? Example: If he completes his work assignment, will he seek to find something constructive to do on his own?

8. How does he seem to get along with your other employees?

9. How do the other workers seem to get along with him?

10. Please, describe his job duties?

11. How do you feel he does in carrying out these jobs?

12. Does he appear to be well motivated and interested in his work?

13. Are there any areas in which you feel ______________ could improve?

14. How regular has his attendance been?

15. If terminated, why?

16. Is the individual's job steady, if not how regular?

Despite the effort which was put into developing a job success index it is apparent to the staff that further improvement is still needed. Members of the staff had some "misgivings" about the final job success rating scores of almost half of the subjects. That this is a serious matter was demonstrated in our validation study of the occupational success predictive battery. The correlations of the occupational success prediction score with the job success rating index could be changed some 30 points by not using subjects whose job success rating index was considered questionable. This problem is discussed further in Chapter VI.

CHAPTER V

THE EXPERIMENTAL BATTERY

The goal in selecting and devising tests for the experimental test battery was to cover as wide a range of aptitude and emotional variables as possible. We hoped to include tests which would not only help predict occupational success but would also provide insight into the mechanics of mental retardation. The latter was necessary because the project proposed not only to develop diagnostic tools but remediation techniques as well.

In searching for some systematic guide to sampling various aptitude areas we chose J.P. Guilford's "Structure of Intellect" model. Tests representing 33 of Guilford's factors were used in the experimental battery. It should be noted that we may not necessarily have exactly replicated Guilford's factors. In the case where several of Dr. Guilford's actual tests were used, several changes were made such as the elimination of written directions, and the addition of simpler items to make them more adaptable to retarded population. Further, in an attempt to include all the tests we felt to be important, and at the same time avoid duplication, in a number of instances existing tests or parts of tests were substituted. For example, we wished to include the Porteus Maze in our battery because of the experiences of the AHRC workshop using it as a device for the prediction of vocational success. So, it was used to present Guilford's factor of Perceptual Foresight, with which it would seem to be closely identified. In any event, the final product was certainly a broader sampling of aptitude areas which coincided with our goal.

Fourteen tests developed from the theories of the Swiss French Psychologist, Jean Piaget, were also included in the aptitude section of the experimental test battery. His tests were included for several reasons. First, was the uniqueness of this application, that is, these specific tests had never been administered to a retarded population. Second, because of their nature, it was thought they might be of considerable value in the remediation phase of the project.

Eight other tests rounded out the aptitude section of the experimental test battery. The Wechsler Adult Intelligence Scale was included of necessity so we could limit our population to those having a full scale I.Q. of 80 or less. The Critical Flicker Fusion and Time Sense tests were selected from Dr. Ward Halsted's "Analyzed Indices of Brain Damage." Also used were a visual efficiency test, a finger and arm motor test, a dexterity coordination test, a simple reaction time test, and a visual memory test from the Merrill Palmer which had shown significant variances in adult retarded populations.

Efforts to develope indices of personality function for the test battery were not as successful as in the aptitude area. The primary reasons for this are the shortage of tests that have been developed for retarded persons and the complete dependence of most standard personality tests on verbal expression. Only the rare retarded person will give sufficient responses to justify the administration of a Rorschach or TAT. It was felt that personality tests of the battery should be as concrete as possible and utilize the subject's abilities to act out his feelings, preferences and desires. As a secondary consideration we felt it would be desirable to stick with tests which were easily administered and scored since this battery might eventually be given by vocational and training counselors with limited experience in sophisticated test administration. These two considerations resulted in a rather abbreviated personality section for the test battery but we could see no satisfactory alternative. We attempted to satisfy these conditions by using performance type tests of personality where a limited number of responses were possible and easily assessible or specifically scaled judgment type alternatives could be compared to a pre-scored reference group.

A promising performance test of personality is the Miniature Situation Test developed by Dr. Sebastian Santostefano. It was devised "to evoke a choice of coping behavior characterized by the subject physically acting upon, manipulating or avoiding the objects in his environment."

The Miniature Situation Test consists of forty-one pairs of situations. The subject chooses one of the two alternatives of each pair and then does the task. An example would be, "Either water this plant or break this light bulb." For our battery we chose to use twenty-seven of the original forty-one pairs of items. These twenty-seven were chosen because they had the highest factor loading for the Murray Need Values which the tasks represented.

Two rating scales were chosen for the personality section of the experimental battery. One of these, "A Scale for Measuring Minimal Social Behavior" by Farina, Ehrenbert and Guskin, was particularly interesting. The subject's responses to a series of situations are evaluated without the subject being aware that any scoring is taking place. For example, the examiner accidently knocks a pencil off his desk - does the subject pick it up? If he does not, will he, if asked? The test begins with the subject's response to the examiner's greeting and ends with their parting. For our use this battery was shortened over the original version and other items of our experimental battery were integrated between the items of the scale. There are no norms presented for this scale but the items lend themselves readily to statistical analysis.

The Laradon Hall Picture Test was devised as a result of our observations of the behavior of the trainees in the Occupational Center. It was observed on many occasions that the trainees appear to be insensitive to common social situations which are a part of any work day. For example, many of the clients in the Occupational Center will walk between two people who are talking, or they will not notice someone who needs help who is working next to them. The emphasis of the test is upon presenting a structured stimulus where the meaning is quite obvious to "normals" and see how well the subject can describe what is happening.

In an attempt to cover other variables noted in observing the Occupational Center trainees, a number of individual tasks or situations were devised on which subject's responses could be scored. Some examples are:

1. Early in the test situation, the subject is asked which he chooses of two objects. Toward the end of the test session the subject is asked which he chose, and then the examiner insists he chose the other one. What is the subject's response?

2. The subject is given three letters to mail and return on each of three days during the last session of the test. Does he do this as instructed?

3. The subject is asked to do a sorting task four times. Each time the conditions are changed. The first time the examiner is present. The second time the examiner leaves the room. The third time considerable distraction is present. The fourth time a reward is offered for higher production. How does the subject's production vary for each situation?

Other tests which were administered include the "It" test designed by Daniel Brown, and a selected number of figures from the MAPS test by Edwin S. Shneidman.

In selecting and devising tests in both sections of the experimental battery we attempted as much as possible to include mostly pencil and paper type instruments that would simplify administration, knowing that expensive and complex equipment would limit the availability of whatever battery might eventually be developed. In selecting tests we also had to consider time limitations as our experimental battery had to be of manageable length. All of the tests which made up the experimental battery are listed below.

EXPERIMENTAL TEST BATTERY

Aptitude

1. Guilford Factors

Guilford Factor Notation

1st Position (Operations)	2nd Position (Contents)	3rd Position (Products)
C Cognition	F Figural	U Units
M Memory	S Symbolic	C Classes
D Divergent Production	M Semantic	R Relations
N Convergent Production		S Systems
E Evaluation		T Transformations
		I Implications

CFC	(Figural Classification)	Defining classes of figures and assigning other figures to the correct classes. (Cattell)
CFI	(Perceptual Foresight)	Porteus Maze Test.
CFR	(Figural Relations)	WAIS Object Assembly and Block Design Tests.
CFS	(Spatial Orientation)	From the groups of clock hand positions which are in varying degrees of rotation, indicate which are identical to the unrotated stimuli.
CFT	(Visualization)	Indicate hole patterns in unfolded paper punched while folded.
CFU	(Visual Cognition)	Identify figures in which a part is mutilated.
CMI	(Conceptual Foresight)	List as many as six ways of accomplishing a task.
CMS	(General Reasoning)	WAIS Comprehension
CMT	(Penetration)	WAIS Similarities
CMU	(Verbal Comprehension)	WAIS Vocabulary and Information Tests
CSS	(Symbolic Patterns)	Discover rules for marking circles in patterns.
DFC	(Figural Spontaneous Flexibility)	Visual field reversal when a blue field is presented to one eye and a yellow field to the other eye.
DMI	(Semantic Elaboration)	Add to given lines in order to produce a meaningful figure.
DMR	(Associational Fluency)	Producing synonyms for given words.
DMT	(Originality)	List remote consequences of certain changes.
DDS	(Expressional Fluency)	Produce sentences containing four specified words.
DSU	(Word Fluency)	Produce words ending with specific suffix: beginning with a specific prefix.
EFU	(Figural Identification)	Find the form identical to a given form. (Cattell)
EMI	(Sensitivity to Problems)	Verbal absurdities from Stanford-Binet.
EMS	(Experiential Evaluation)	WAIS Picture Completion and Cattell Unusual Details.
EMT	(Judgement)	Making quantitative estimates based upon common experience.

ESU	(Symbolic Identivication)	Circle X's scattered among other letters over a page.
MFC	(Memory for Spatial Order)	Page position recall of objects previously studied.
MMR	(Meaningful Memory)	Recall the second nouns of previously studied related pairs.
MMS	(Memory for Temporal Order)	Recall on which of four pages certain previously studied pictures occurred.
MSR	(Rote Memory)	Recall the word paired with a given color in a previously presented list.
MSU	(Memory Span)	WAIS Digit Span
NFI	(Symbol Substitution)	Solve simple equations given in terms of familiar geometric forms.
NFU	(Object Naming)	Selecting Named Object Test from Cattell.
NMR	(Semantic Redefinition)	Indicate which of four listed objects has a part that will serve a definite purpose.
NSI	(Numerical Facility)	Written arithmetic problems.

II. Piaget Tests

Form Classification:	Qualitative classification of variously colored forms.
Figural Redefinition:	Indicate location of simple geometrical figures in an entangled context.
Size Judgments:	Comparing circle sizes with a regular circle and a concentric circle stimuli. Measures degrees of illusion under two conditions.
Visual Transport:	Comparing line lengths in two conditions: a) adjacent, and b) remote. Measures degree of illusion introduced by visual "movement" (or transport) behavior.
Class Inclusion:	Deduction involving the extension of a total class with its sub-class.
Conservation of Substance:	Constancy of equally perceived units of clay.
Conservation of Weight:	Constancy of equally perceived weights of clay.
Entrecroisse:	Filling in of incompleted lines to make geometrical figures.
Haptic (tactual) Perception:	Identification of tactually perceived designs and the drawing of them.
Equilibrium Balance:	A complex task using a simple balance and various multiple unit weights.
Seriation Test:	Seriation and cardination involving the units of two separate but correlated series.
Conservation of Number:	Constancy of quantification involving parallel series.
Moral Judgment:	Opinions concerning the rationale of honesty.

III. Other Tests

Critical Flicker Fustion:	Measurement in cps of the rates at which flicker and fusion are seen in a light at varying frequencies of oscillation.
Time Sense:	Ability to determine the passage of a series of 10-second periods.
Motor Speed:	Fore-arm and finger dexterity.
Motor Coordination:	Bilateral simultaneity of hand movements with and without visual cues.
Tapping Blocks (Knox Cube Imitation):	A visual-motor memory test.

Personality

IV. Miniature Situation Test:	Santostefano's battery contains 41 forced choice items. For our population, only 27 of the items are included. These are paired items in which the subject chooses the one he "feels like doing." The items are designed to reflect needs in terms of Murray's System. (As an example, tearing paper vs repairing paper is defined as aggression vs order.) Other dimensions are: exhibitionism vs deference; exhibitionism vs dominance vs abasement; dominance vs abasement; deference vs abasement; expansiveness vs contractiveness; achievement vs abasement; achievement vs avoidance; aggression vs deference; aggression vs inhibiting; aggression vs order; aggression vs nurturance; nurturance vs succorance; nurturance vs deference; impulsiveness vs endurance; inpulsiveness vs order; dominance vs submissiveness; abasement vs succorance; abasement vs aestheticism; self-defensiveness vs non-self-defensiveness; autonomy vs order; harm avoidance and aggression vs curiosity and exploring the unfamiliar; change vs achievement; aesthetic vs dominance.
V. Laradon Hall Picture Test:	A series of 10 photographs of actual people in various situations. Some pictures are highly structured, others are more subtile. These pictures were developed at Laradon and are presented to the subject for his free association. A series of questions is also asked after each picture is presented.

VI. Three Wishes Test: The subject is asked to make three wishes. "What three wishes would you make if you could have anything in the world"?

VII. IT-Test: A series of choices which are made by the subject for an "it" figure. Developed by Daniel Brown it is used to give some very general idea of the masculine-feminine identification of the subject.

VIII. MAPS Test: A series of figures are given to the subject to separate into those he likes, those he does not like. Then he is asked to choose the most liked from the two categories. He is also asked which he would like to be and which he would choose for a friend.

IX. Direct Interview Questions: Do you adjust TV, read at home, write letters, answer ads, believe in Santa Claus, make your bed, travel by yourself, make phone calls, tell time?

X. Check List: The following dimensions are rated by four testers. The dimensions were adapted from a study by Buss and Gerjuoy.

Hostile attitudes
Sexual attitudes
Autonomy
Self esteem
Guilt
Ideation
Physical hostility
Physical sexuality
Dominance
Guardedness
Mood
Impulsiveness
Verbal Hostility
Emotional warmth
Sociability
Flexibility
Anxiety
Ambition

XI. Other Tests A series of questions relating to money, buying and saving.

Whether or not three letters are mailed back to the tester as instructed.

The subject's response to:

-A coffee can rolling unexpectedly toward the edge of the table.

-A situation where a yellow and a white envelope are presented and one is chosen. Later the subject is asked which he chose and the tester then claims he chose the other one.

-The choice between a small candy bar now or a large candy bar later.

-A sorting task, on which a basic work rate has been established with the subject, under three conditions.

1. With the examiner out of the room.
2. With considerable distraction present.
3. With a reward offered for higher production.

-Blocking Tasks - The putting together of a set of nuts and bolts, none of which match. The task of driving nails into a very hard surface. A game of darts where the darts will not stick to the target.

The following are noted or tested:

Posture, gait, laughter, physical deformities, vision, stature, hand dominance, dress, hair, facial expressions, degree of cooperativeness, general manner, appointments, relationship to interviewer.

CHAPTER VI

STATISTICAL TREATMENT OF THE EXPERIMENTAL BATTERY

Our objective in this statistical treatment was to reduce the 101 variables involved in the experimental battery down to a more workable number which would efficiently predict job success and would become the Occupational Success Predictive Battery. One means of doing this would be to correlate these variables to the Job Success ratings of the sixty subjects and select those variables with the highest correlation. Another would be by utilizing factor analytic methods.

We felt the factor analytic method held the most promise because in addition to predicting job success the project also proposed to develop means of remediating critical deficiencies which interfered with job success. Thus, we wished to know not only what tests were critical but the nature of these tests, and the relationship between these variables.

Although in the end the tests for the Occupational Success Predictive Battery were selected largely on the basis of having the highest correlation with the Job Success ratings, the largest share of statistical time and effort was involved in a series of factor analysis.

Initially a gross orthogonal factoring of all 101 variables was conducted. Following this was an orthogonal analysis on 20 variables related to emotional functioning. Unfortunately, a significant error existed in both of these analysis due to program deficiencies so they were not presented.

With the failure of our initial factorings, we selected 17 variables that had a significant correlation with job success from a correlation matrix of 90 variables, and submitted them to an orthogonal factoring.

The five factors and variable loadings are given in Table 6-1.

Table 6-1

Five Factors Developed by Orthogonal Rotation of 17 Variables

Variables	Factors					
	F1	F2	F3	F4	F5	h^2
MST #2: Approach threat		39		33		
MST #6: Status quo v. Adventure		-40	-36	-32	-25	
MST #8: Leader control v. Follower			52			
Social Insight	76		23			
Task, increase with reward					58	
Sex role identification			42			
IPAT Unusual Details	47	46				
WAIS Arithmetic		56				
WAIS Object Assembly	28	73				
WAIS Block Design		62			30	
Time Estimation (Halstead)			-36	-44		
Reaction Time				-50		
Knox Cubes (modified)	33				33	
Wtd. Composite of motor tests				35		
Composite of verbal fluency	66					
Class Inclusion (Piaget)	36	36			36	
Conservation (Piaget)	28	33	30		44	

All five factors suggest significant correlations with job success. We were particularly impressed with the trend of both MST #2 and MST #6 to be appropriately loaded on all four factors suggesting that this personality characteristic was common to more than one aptitude pattern. We were particularly attracted to Factors II and IV which had the highest correlations with Job Success, .49 and .43 respectively. Factor II seemed to involve reasoning and Factor IV was characterized by motor functioning. Factor III was more loaded on personality items. Factor IV suggests "spacial" aptitude and motivational loading.

At this point it was brought to our attention that the factors derived from a factor analysis are a function of the variables analyzed. That is, any of these factors might have appeared in a different order or with different factor loading strengths and patterns merely by the elimination and/or addition of variables.

Consequently, we decided to return to the original 101 variables. By eliminating all variables which were composites or duplicates and all variables which did not reflect a reasonable degree of variability the total number of variables was reduced to 59. These variables were then put into another factor analysis. The factor loadings of the 59 variables are given in Table 6-2.

Analysis of this factoring indicates the expected strong general Factor I, but of considerable surprise is the existence of a Factor II of both "motor" and "reasoning" variables, though with opposite signs. Another, but expected result was the dropping out of the personality variables due to the personality items making up a smaller proportion of the variable universe.

Table 6-2
Factor loadings of 59 variables.

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	COMMUNALITIE
MST #1 Overt Agg.	----	----	-.46	----	----	----	----	-.34	.05
2 MST #2 App/Avd	----	----	-.36	----	+.36	----	----	----	.04
1 MST #3 Covert Agg.	----	----	----	----	----	----	----	----	.02
1 MST #4 Exhibition	----	----	----	----	----	----	----	----	.03
1 MST #5 Autonomy	----	----	----	----	----	----	----	----	.02
4 MST #6 Ctn/Adven.	+.35	----	----	----	----	+.31	----	----	.05
1 MST #7 Abasement	----	----	----	----	----	----	+.37	----	.03
2 MST #8 Lead/Follow	----	----	----	----	----	+.34	----	-.31	.04
1 IT	----	----	----	----	----	----	----	----	.03
2 Wishes B:Prac.Pers.	----	----	----	+.30	-.31	----	----	----	.04
1 Wishes B:Per&Finl.	----	----	----	----	----	----	----	----	.02
3 Sit.Insight Pix.	+.60	-.32	----	----	----	----	----	----	.06
1 DISC SORT:Dist&Ab.Cd.	----	----	+.30	+.30	----	-.30	-.37	-.41	.07
1 DISC SORT: Reward	----	----	----	+.35	----	----	----	-.39	.05
2 Approp. shifts	----	----	----	----	----	----	----	----	.03
2 MTR.Spd.Purs.Rtr.	+.69	----	----	----	----	----	----	----	.06
3 MTR.Spd.Tapping	+.51	----	----	+.30	----	----	----	----	.05
3 MTR.Spd.Aiming	+.58	-.32	----	+.31	+.32	----	----	----	.07
4 MTR.Spd.Reaction	+.52	----	----	----	----	----	----	----	.04
2 MTR.Spd.Dex.-Arm	+.64	-.39	----	----	----	----	----	----	.07
3 MTR.Spd.Dex.-Forearm	+.57	-.34	----	----	----	----	----	----	.06
4 MTR.Non.Knox Cubes	+.53	----	----	----	----	----	----	----	.04
1 Memory Spatial	----	----	----	----	----	----	----	----	.03
1 Memory Temporal	----	----	+.33	----	----	----	----	----	.03
1 MEMORY Ipat:Nmd.Obj.	+.52	----	----	----	-.34	----	----	----	.05
2 Mem.WAIS Dig.Span	----	----	+.36	----	----	+.35	----	----	.05
3 Mem.WAIS Dig.Sym.	+.56	-.31	----	+.31	----	----	----	----	.06
2 Time Estimation	+.34	----	-.31	----	----	+.31	----	----	.05
1 Crit.Flkr.Fusn.	----	----	----	----	----	----	----	----	.02
2 Piaget Trans.Illsn.	+.41	----	-.30	----	----	+.35	----	----	.05
1 Piaget Circle Illsn.	----	----	----	----	----	----	----	----	.03
2 Piaget Haptic Perc.	+.62	----	----	----	----	----	----	----	.05
1 IPAT Form Discrim.	+.31	+.30	----	----	----	----	----	----	.03
1 SPEED Scattered X's	+.49	----	----	----	----	----	----	----	.04
2 Porteus Maze	+.63	----	----	----	----	----	----	----	.06
2 Spatial-Clck.Orien.	+.58	----	----	----	----	----	----	----	.06
2 Circle Reasoning	+.47	----	----	----	----	----	+.34	----	.05
2 WAIS Block Design	+.59	----	----	----	----	----	----	----	.05
4 Written Arithmetic	+.45	+.35	+.39	----	----	----	----	----	.06
3 WAIS Arithmetic	+.55	+.36	----	----	----	----	----	+.31	.07
3 IPAT Classification	+.40	----	----	----	----	----	----	----	.03
3 Piaget Equilibrium	+.51	----	----	----	-.31	----	----	----	.05
3 IPAT Unusual Detls.	+.65	----	----	----	----	----	----	----	.06
3 WAIS Object Assembly	+.54	----	-.42	----	----	----	----	----	.05
2 WAIS Pix. Completion	+.53	----	----	-.34	----	----	----	----	.06
2 WAIS Pix. Arrangement	+.65	----	----	----	----	----	----	----	.06
1 Piaget Incom.Figs.	----	----	-.32	-.42	----	----	----	----	.04
1 WAIS Vocabulary	+.40	----	+.36	-.31	----	+.33	-.32	----	.06
1 Produce Synonyms	----	----	+.45	----	----	----	----	----	.06
3 4-word sentences	+.51	----	+.35	----	----	----	----	----	.05
1 Pfx./Sfx. words	+.30	----	----	----	-.36	----	----	----	.04
1 Remote Consequences	+.30	----	----	-.42	+.31	----	----	----	.05
1 Alternate Methods	+.42	----	----	----	----	----	----	----	.04
1 S-B Absurdities	+.62	----	----	----	----	----	----	----	.05
1 WAIS Comprehension	+.59	----	----	----	----	----	----	----	.06
1 WAIS Information	+.31	----	+.55	----	----	----	----	----	.05
1 WAIS Similarities	+.50	----	+.33	----	----	----	----	----	.05
4 Piaget Conservation	+.55	----	----	----	----	----	----	-.33	.05
2 Piaget Cls.Inclsn.	+.52	+.32	----	----	----	----	----	----	.05

With no assurance that we could develope an effective Occupational Success Predictive Battery by continuing the factor analytic process in time to take advantage of populations for our cross-validation study, we returned to the correlation matrix of 59 variables. The decision was made to make use of this correlation matrix to discover by direct examination which of the aptitude variables had a prima facie relationship to job success. The 44 aptitude variables were, therefore, arranged on a continum running from simple to complex functioning and by noting it's correlation to job success a new correlation matrix was constructed. This correlation matrix appears on the fold-out section between pages 40 and 41.

In order to distinguish aptitude areas as well as individual aptitude variables that had a significant relationship to job success, a coding system of shading and banding was applied to the matrix. This coding makes it possible to see at a glance not only the variables that are significantly related to job success but also the existence of any tendency for these to group together. The result of this procedure was that two general areas of aptitude functioning emerged which contained most of the highly significant (1% level) and significant (5% level) correlations. Outside of these two groups there were only occasional variables that attained significance. These two groups can be described as a motor reaction and coordination area and a deductive and general experience area. The Occupational Success Predictive Battery was constructed primarily from tests in these two areas.

It is interesting to note the insignificant relationship of the academic knowledge and reasoning areas (except for arithmetic). This suggests one source of the weakness of standard IQ tests in predicting job success for the retarded.

CORREL
APTIT

	MOTOR - Pursuit Rotor	MOTOR - Medium Tapping (Fleischmann)	MOTOR - Aiming	MOTOR - Reaction Time	MOTOR - Dexterity, Arm	MOTOR - Dexterity, Forearm	MOTOR - Knox Cubes (modified)	MEMORY - Spatial Memory	MEMORY - Temporal Memory	MEMORY - IPAT Object Recall	MEMORY - WAIS Digit Span	MEMORY - WAIS Digit Symbol	Time Estimation (Halstead)	Critical Flicker Fusion (Halstead)	Transport Illusion (Piaget)	Circle Illusion (Piaget)	Haptic Recognition (Piaget)	IPAT Form Discrimination	CLERICAL SPEED - Scattered X Search	Maze (Portens)	SPATIAL - Clock Orientation	Circle Reasoning	WAIS Block Design	Written Arithmetic (WRAT)	Arithmetic (WAIS)	IPAT Classification	Conservation (Piaget)
MOTOR - Pursuit Rotor																											
MOTOR - Medium Tapping (Fleischmann)	45																										
MOTOR - Aiming	60	63																									
MOTOR - Reaction Time	-28	-20	-38																								
MOTOR - Dexterity, Arm	65	45	57	-29																							
MOTOR - Dexterity, Forearm	57	28	51	-23	81																						
MOTOR - Knox Cubes (modified)	23	19	24	-14	-38	34																					
MEMORY - Spatial Memory	24	25	12	-	22	18	15																				
MEMORY - Temporal Memory	16	-	15	12	12	18	17	-																			
MEMORY - IPAT Object Recall	27	23	17	-24	23	24	34	14	-																		
MEMORY - WAIS Digit Span	-	20	-	-14	-	-	25	-18	10	46																	
MEMORY - WAIS Digit Symbol	41	55	55	-34	39	38	33	12	10	29	10																
Time Estimation (Halstead)	-26	-23	-29	27	-29	-23	-19	-13	-	-	10	-16															
Critical Flicker (Fusion (Halstead)	14	16	24	-	10	-	-	-14	-14	-	-	11	-23														
Transport Illusion (Piaget)	-34	-	-19	27	-18	-18	-	-	-	-27	-17	-10	30	-23													
Circle Illusion (Piaget)	-22	-	-16	-	-19	-19	-17	18	11	-20	-12	-	11	-	32												
Haptic Recognition (Piaget)	39	27	28	-34	40	32	28	25	-	35	-	13	-41	-	-19	-23											
IPAT Form Discrimination	13	-	-	-22	10	-	19	12	-20	30	-	-	-	-	-	-	27										
CLERICAL SPEED - Scattered X Search	52	11	25	-18	38	29	28	-	-	25	-	24	-29	15	-31	-35	36	22									
Maze (Porteus)	43	47	40	-33	41	32	26	37	-	35	-	47	-14	-	-13	-14	50	29	22								
SPATIAL - Clock Orientation	40	28	24	-22	36	32	35	-	14	44	23	22	-13	21	-33	-11	41	34	24	36							
Circle Reasoning	18	14	-	-	27	27	45	25	-	34	31	13	-18	-	-27	-	34	14	22	21	42						
WAIS Block Design	44	30	15	-23	36	33	30	26	-	38	15	36	-18	23	-33	-	38	29	18	42	50	28					
Written Arithmetic (WRAT)	-	37	26	-29	-	-	41	-	13	42	50	40	-	-	-	22	17	19	-	28	23	35	20				
Arithmetic (WAIS)	11	29	34	-26	18	26	28	-	27	24	30	27	-	24	-10	-	39	18	-	35	44	23	36	64			
IPAT Classification	41	32	32	-16	16	11	16	-	17	-	11	27	-17	16	-32	22	14	-	13	15	24	25	19	36	32		
Conservation (Piaget)	48	26	37	-26	20	15	23	-	20	24	13	42	-29	24	-30	16	43	17	36	33	46	25	40	20	24	30	
Equilibrium (Piaget)	34	17	21	-33	21	21	24	-	-	30	32	-	-22	-	-44	-19	42	32	38	24	39	40	33	19	30	28	32
IPAT Unusual Details	48	27	24	-35	33	32	31	23	13	40	16	26	-25	-	-43	-10	52	34	34	50	43	28	47	34	32	34	24
Object Assembly (WAIS)	45	38	24	-13	45	42	20	23	-	16	-	17	-30	13	-31	-	59	23	10	53	40	30	52	15	36	38	27
Picture Completion (WAIS)	38	-	25	-24	28	21	31	29	12	20	-18	-	-12	13	-44	-	39	41	22	44	42	29	29	-	29	29	23
Picture Arrangement (WAIS)	44	25	21	-44	31	23	28	39	-	39	-	30	-11	-	-25	-	44	38	27	40	27	27	46	17	20	38	31
Incomplete Figures (Piaget)	14	-	-	-24	12	-	12	18	-19	-	-15	-	-23	11	-23	-15	42	13	17	28	-10	13	19	-	-	-	-
Vocabulary (WAIS)	20	-	15	-35	10	-	11	-	-10	20	27	20	-	10	-	12	29	12	24	15	-	33	-	36	28	23	25
Synonyms (after Guilford)	11	-	-	-31	18	13	24	-14	21	17	19	31	13	-22	-	-12	11	-	28	26	-	-	-	10	-	-	-
Sentence Development, 4 Word Stimulus (after Guilford)	26	17	27	-37	30	19	35	12	12	[illegible]	[illegible]	26	-18	-	-	17	29	17	16	21	26	26	10	48	40	13	37
Word Completion, Prefix/Suffix Cues (after Guilford)	12	13	23	-26	16	12	20	-12	-	29	-	39	-	-12	-	-13	11	15	21	30	26	-	18	19	-	19	-15
Remote Consequences (after Guilford)	15	-	18	-27	32	37	-	-	-	-	-	-	-42	-	-20	-	31	-	11	-	-	-	-	-14	13	-	-
Alternate Methods (after Guilford)	35	24	22	-28	19	13	14	21	-	22	18	-	-	-	-27	-16	20	25	-	36	26	26	13	10	12	22	-
Absurdities (Stanford-Binet)	40	19	28	-37	19	17	33	30	14	28	-	31	-18	-	-26	-	31	38	39	38	33	26	29	30	35	35	27
Comprehension (WAIS)	39	14	32	-37	48	43	15	17	-	32	-	33	-18	12	-32	-20	30	20	38	30	31	31	27	14	30	18	14
Information (WAIS)	-	-	-	-	-	-	35	11	20	33	39	-	11	-	-	-	-	15	25	13	24	23	-	41	34	-	-
Similarities (WAIS)	33	36	25	-26	15	15	20	13	-	41	30	39	-17	-	-	-13	33	11	28	33	18	22	22	32	27	16	20
Class Inclusion (Piaget)	36	-	-	-14	17	19	35	36	22	44	24	24	15	-	-20	-	32	17	28	36	30	30	38	16	26		19

CORRELATION MATRIX OF APTITUDE VARIABLES

KEY

▒ 1% level of significance

▭ 5% level of significance

▨ approaching 5% level of significance

☐ not significant

ime Estimation (Halstead)	Critical Flicker Fusion (Halstead)	Transport Illusion (Piaget)	Circle Illusion (Piaget)	Haptic Recognition (Piaget)	IPAT Form Discrimination	CLERICAL SPEED - Scattered X Search	Maze (Portens)	SPATIAL - Clock Orientation	Circle Reasoning	WAIS Block Design	Written Arithmetic (WRAT)	Arithmetic (WAIS)	IPAT Classification	Conservation (Piaget)	Equilibrium (Piaget)	IPAT Unusual Details	Object Assembly (WAIS)	Picture Completion (WAIS)	Picture Arrangement (WAIS)	Incomplete Figures (Piaget)	Vocabulary (WAIS)	Synonyms (after Guilford)	Sentence Development, 4 Word Stimulus (after Guilford)	Word Completion, Prefix/Suffic Cues (after Gilford)	Remote Consequences (after Guilford)	Alternate Methods (after Guilford)	Absurdities (Stanford-Binet)	Comprehension (WAIS)	Information (WAIS)	Similarities (WAIS)	Class Inclusion (Piaget)
-23																															
30	-23																														
11	-	32																													
41	-	-19	-23																												
-	-	-	-	27																											
29	15	-31	-35	36	22																										
14	-	-13	-14	50	29	22																									
13	21	-33	-11	41	34	24	36																								
18	-	-27	-	34	14	22	21	42																							
18	23	-33	-	38	29	18	42	50	28																						
-	-	-	22	17	19	-	28	23	35	20																					
-	24	-10	-	39	18	-	35	44	23	36	64																				
17	16	-32	22	14	-	13	15	24	25	19	36	32																			
29	24	-30	16	43	17	36	33	46	25	40	20	24	30																		
22	-	-44	-19	42	32	38	24	39	40	33	19	30	28	32																	
25	-	-43	-10	52	34	34	50	43	28	47	36	32	34	26	40																
30	13	-31	-	59	23	10	53	40	30	52	15	36	38	27	20	54															
12	13	-44	-	39	41	22	44	42	29	29	-	29	29	23	38	61	48														
11	-	-25	-	44	38	27	40	27	27	46	17	20	38	31	38	46	35	44													
23	11	-23	-15	42	13	17	28	-10	13	19	-	-	-	-	23	37	17	33	28												
-	10	-	12	29	12	24	15	-	33	-	36	28	23	25	29	22	-	15	40	18											
13	-22	-	-12	11	-	28	26	-	-	-	10	-	-	-	-	20	-	-	28	-	32										
18	-	-	17	29	17	16	21	26	26	10	48	40	13	37	30	27	14	27	29	-	50	27									
-	-12	-	-13	11	15	21	30	26	-	18	19	-	19	-15	11	23	-	10	17	-	12	39	20								
42	-	-20	-	31	-	11	-	-	-	-	-14	13	-	-	-	27	27	21	21	22	22	-	18	-							
-	-	-27	-16	20	25	-	36	26	26	13	10	12	22	-	32	40	24	43	31	24	31	-	25	10	18						
18	-	-26	-	31	38	39	38	33	26	29	30	35	35	27	17	44	24	44	55	17	30	11	36	27	38	23					
18	12	-32	-20	30	20	38	30	31	31	27	14	30	18	14	25	26	25	39	34	15	43	26	40	28	53	28	43				
11	-	-	-	-	15	25	13	24	23	-	41	34	-	-	-	-	-	12	10	-11	41	29	36	-	10	31	27	40			
17	-	-	-13	33	11	28	33	18	22	22	32	27	16	20	-	23	15	-	22	10	52	27	40	16	30	22	32	47	38		
15	-	-20	-	32	17	28	36	30	30	38	16	26		19	24	29	15	23	40	11	16	12	19	-	-	21	44	17	27	29	29

A final attempt at utilizing factor analytic methods to arrive at an Occupational Success Predictive Battery after reviewing Taylor's study which provided some confirmation of our hesitant factoring of aptitude into a motor grouping and a reasoning grouping, and their relation to job success.

Eighteen variables were selected for their tendencies to correlate significantly with one of four hypothesized factor areas and their tendency to be insignificantly correlated with the other three factor areas we wished to emphasize. Thus, our strategy might be thought of as differentiating factors by the simple process of selecting variables that were "pure" for each factor and that factor alone.

We attempted to control unnecessary distortion by representing each factor by roughly the same number of variables in the matrix to be factored, i.e. 4 or 5 variables. In three of the factors this was not difficult, but there was some problem in locating enough variables that satisfied our criteria of "purity" that would represent the deductive reasoning area separate from the others.

The areas we were trying to reproduce and the variables that we selected for their "purity" in representing each factor complex are as follows:

Crystalline Factor

WAIS Comprehension

WAIS Information

WAIS Similarities

WAIS Vocabulary

Description: This is a fairly common crystalline factor found by factoring the WAIS. We favor a slightly different interpretation emphasizing rote knowledge acquisition and de-emphasizing deductive reasoning implications with a retarded population.

It is interesting to note that this factor occurred in our gross factoring of 59 variables.

Gestalt Completion Factor

- IPAT Unusual Details
- WAIS Picture Completion
- Piaget Conservation Group
- WAIS Picture Arrangement
- Piaget Equilibrium

Description: This is a factor we found derived and named by Taylor; he found it strongly associated to a clever modification of the Street Gestalt Perception Test that he devised. Many of the WAIS Performance tests load on this factor, but not "purely."

Deductive Reasoning Factor

- WRAT/WAIS Arithmetic
- IPAT Classification
- Knox Cubes
- Circle Reasoning (after Guilford)

Description: This group was included in Taylor's Gestalt Completion factor, but we felt quite justified in trying to differentiate them by emphasizing the difference between conscious deduction from gestalt completion of spatial imagery.

While these arithmetic tests have loadings on the crystalline factor, we interpret it as due more to rote memory there, whereas the conceptual understanding of the arithmetic relationships would be emphasized here. The WRAT and WAIS arithmetic tests were combined as thev were highly correlated and it was felt that they would be a distorting influence separately, yet would gain reliability in combination.

Motor Factor

- Tapping
- Aiming
- WAIS Digit Symbol
- Nail Board Dexterity, vertical condition
- Nail Board Dexterity, horizontal condition

Description: This was our motor group that tended to hang together fairly well. All these tests were speeded, though some were very short (½ min.) and one was long (5 min.).

The correlation matrix was submitted to an orthogonal analysis and rotations. The machine was instructed to continue selecting factors until the residual matrix had no residual correlations above .25. Under these conditions, five factors were produced. The variables and factor loadings are presented in Table 6-3 below.

Table 6-3

Variable Leadings on Five Orthogonally Derived Factors

Variable	F3	F 1	F 5	F4	F 2	h^2
WAIS Comprehensive	.62	-.27		-45		.69
WAIS Information	54		46			.56
WAIS Similarities	64				30	.55
WAIS Vocabulary	71	-28				.33
IPAT Unusual Details		-66				.68
WAIS Picture Completion		-72				.64
Piaget Conservation		-41			40	.58
WAIS Picture Arrangement		-59				.57
Piaget Equilibrium		-56				.55
WRAT/WAIS Arithmetic	30		49		40	.59
IPAT Classification		-34			40	.40
Knox Cubes			64			.31
Gf. Circle Reasoning		-38	45			.59
Tapping				-25	53	.38
Aiming				-34	66	.51
WAIS Digit Symbol					70	.58
Nail Board Dexterity-vertical				-84	29	.46
Nail Board Dexterity-horizontal				-79		

Only loadings above .05 level of confidence presented.
Outline indicates expected factor groupings.

The results generally followed our expectations except for two major exceptions. The Reasoning factor did not stay clear of the Gestalt Completion and the Motor factor broke into two factors. The Crystalline factor and Gestalt Completion turned out very well, though.

The Reasoning factor was the factor we had difficulty in finding tests that were independently "pure" on. Still, the factor did show, though it was somewhat disappointing to share much variance with other factors, particularly the Motor Factor II.

The Motor variables breaking into two factors was quite unexpected. On the possibility that it could be corrected by dropping the Nail Board Dexterity - horizontal, which was highly correlated (.81) with Nail Board Dexterity - vertical, and thus developing a strong intra-factor commonality that could masquerade as a separate factor, we ran another factor analysis on the basis of 17 variables.

The analysis with 17 variables still contained the same 5 factors, though Factor IV variables were significantly reduced in general, and Nail Board Dexterity - vertical gained considerably loading on Factor II. While much of Factor IV unexpected behavior must be attributed to the strange association with WAIS Comprehension, there is another patterning that does make sense. That is, that we are operating with two separate factors at this point and the motor variables are loaded on both. On this basis, Factor IV might be interpreted as primarily a "motor speed-dexterity" factor involving visual-motor coordination. Factor II could then be thought of as only secondarily motoric for a retarded population, but basically involving more cognitive-type processes, in particular discrimination and recognition judgments as in WAIS Digit Span, that showed the greatest independence of Factor IV. The Tapping variable also depends upon the subject having some conception of "triple grouping", and Tapping was next to WAIS Digit Span in its independence. If this hypothesis is correct, then we might find that Factor II was basically a "clerical perception speed"-type factor on a retarded population, and only secondarily involved with motor dexterity.

Because of limitations in time, further development of this factor analysis was not possible.

CHAPTER VII

THE LARADON OCCUPATIONAL SUCCESS PREDICTIVE BATTERY

Seventeen tests were finally selected from the experimental battery to compose the Laradon Occupational Success Predictive Battery. Most of these are measures of aptitude rather than measures of emotional or personality functioning. The reason for this was not simply our bias in assigning priority to aptitude functioning, but resulted in large measure from our inability to find tests providing estimates of emotional or personality characteristics which could confidently be used with a retarded population. The Laradon Hall Picture Test was our own invention to help overcome this lack. The list below gives a brief description of the tests included in the battery and the modifications, if any, which were made in some of the standard tests.

1. Santostefano Miniature Situations Test Factor #2: Achievement. Measures willingness to approach potentially difficult, threatening or injurious situations rather then to avoid and withdraw from such tasks. (The Miniature Situations Test is a factor analyzed performance test of personality consisting of forty-one pairs of concretely presented activities. The subject chooses one of the two alternatives of each pair and then does the task.)

2. Santostefano Miniature Situations Test Factor #6: Adventurousness. Measures willingness to change the status quo rather than to stick with known and certain.

3. Transport Illusion: (From Piaget) Index of oculomotor scanning.

4. Laradon Hall Picture Test. Measures subjects ability to understand the point of common social problem situations presented in realistic photographs.

5. Dexterity Test on Nail Board. Measures speed of putting nails in board.

6. Cattell's IPAT Classification Test: (Formal)
   Measures S's aptitude to dichotomously classify unordered stimuli.

7. Cattell's IPAT Unusual Details Test: (Form 1)
   Measures subject's ability to perceive incongrous or missing details in simple pictures.

8. Wide Range Achievement Test: (Modified)
   Test S's aptitude in addition, subtraction, multiplication and division only. Untimed.

9. WAIS Object Assembly Test: (Unmodified)

10. WAIS Block Design Test: (Unmodified)

11. Halstead's Time Estimation Test.
    Measures tendency to over or under estimate a ten second time interval.

12. Reaction Time Test: (After Pieron)
    Measures speed of reaction.

13. Modified Knox Cube Imitation Tapping Test.
    Measures ability to touch blocks in patterns of increasing complexity.

14. Aiming: (Fleischmann)
    Measures visual motor accuracy.

15. Four-Word Sentences: (After Guilford)
    The aptitude to produce a sentence using four (4) given words.

16. Medium Tapping: (Fleischmann)
    Measures speed of visual motor dexterity.

17. Piaget Conservation Group
    Measures ability to see the invariance of substance, weight, and number when superficial changes are made and to perform elementary operations of seriation.

A multiple regression analysis was employed to validate the Occupational Success Predictive Battery on the original sixty subjects. The multiple R score of .54 derived from this analysis shows that the proper weighting of subtest scores on the Battery can be somewhat effective in predicting job success. Figure 7-1 shows the co-ordination of the Occupational Success Predictive Battery scores and the Job Success Rating Index scores for the sixty subjects.

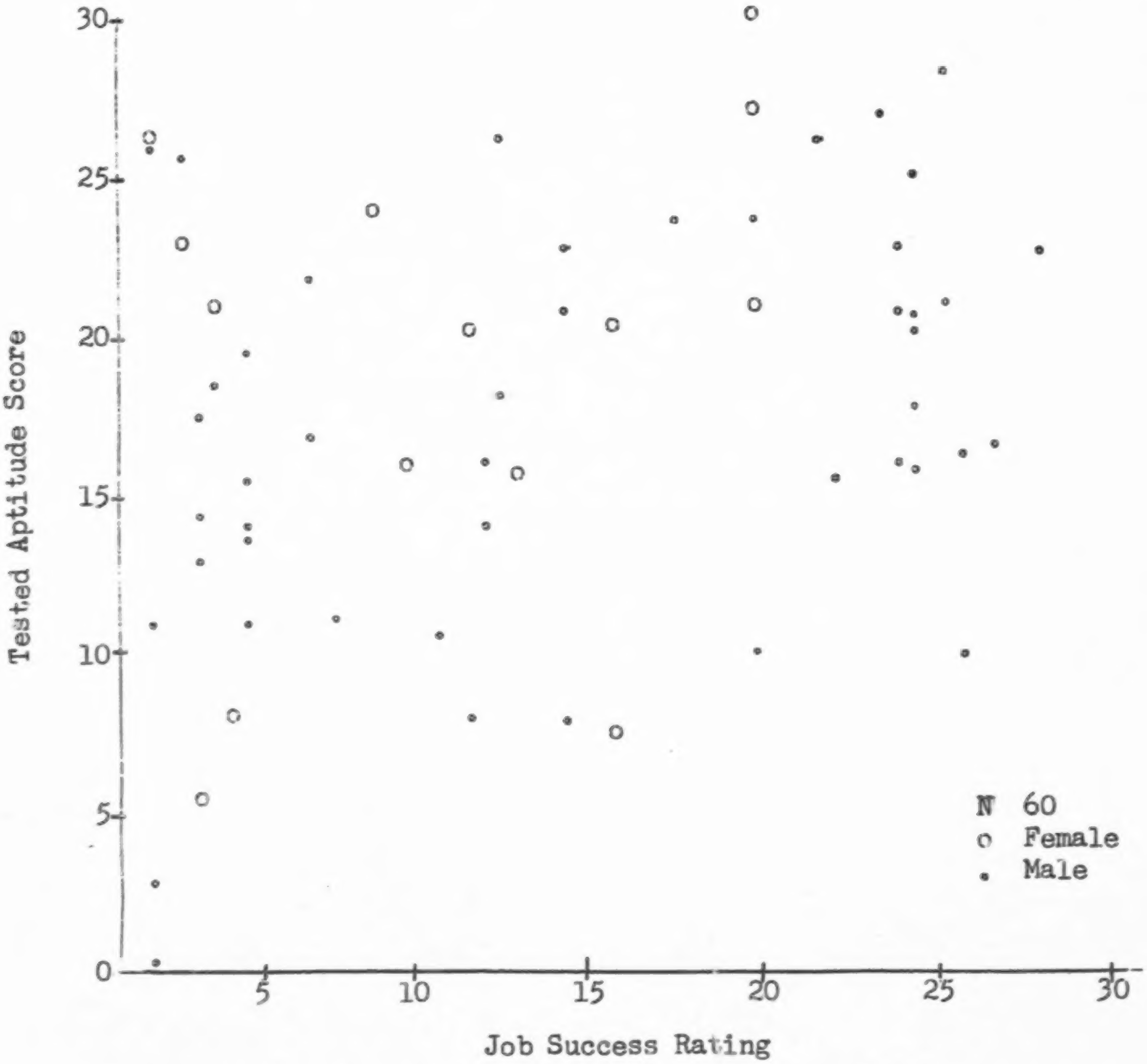


Figure 7-1: Distribution of tested aptitude scores as a function of job success ratings for the validation group of sixty subjects.

These results with the validation group were not particularly encouraging, as the strong correlation we had hoped for did not appear. Our experience suggests some reasons why this happened.

The first and probably most important reason is the heterogeniety of the group and the primary element contributing to this heterogeniety is sex. The female subjects as a subgroup tended to score higher on tested aptitude and lower in the job success rating than the male subjects. In fact, if the distribution in figure 7-1 is divided into quadrants, it will be seen that fully half the female subjects fall in the quadrant, which would indicate a high aptitude but a low actual job achievement. Our experience in training and placing retarded persons has led us to the conclusion that the employment opportunities for retarded females are much less than that for males. For one thing, there appears to be fewer job openings for female retardates in the community. Perhaps just as important is a reluctance on the part of parents and guardians (including institutions) to expose their female wards to social situations in which their sexual activity could not be closely supervised. Under these circumstances it would seem desirable to separate male and female subjects in studies of factors related to job success unless controls are instituted to correct this bias.

In addition to sex, another element was felt to contribute to the heterogeniety of our experimental group. This element was the sociological background of the individual subject which varied over a wide range. The influence and support of families of retarded persons varies widely and can often have a decisive effect in determining successful employment.

Some families are indifferent while others are over solicitous and interfering. Some show thoughtful concern and encouragement. This factor is certain to affect the chances of job success, although the degree of influence it has was not investigated in this study.

It was our hope that important aptitude factors could be discovered in an experimental population which was broad enough in character that there would be some justification for generalizing the results to the groups of retarded persons likely to be served by local rehabilitation agencies. Our results suggest that we were not sufficiently effective in obtaining the population we sought and did not in fact ever overcome the problems connected with obtaining a representative population. It seems likely that the resources necessary for handling this difficulty can be secured only through the employment of the funds and personnel available to a major institution such as the public schools.

There is a final point that needs to be made in connection with a discussion of the predictive powers of the battery, and this point concerns a weakness in the experimental design that was not foreseen. The weakness was in having judges rating the job success of the subjects without devoting enough effort to making sure that the definition of job success we were after was clear to these judges. This may have been a simple failure to communicate, but with the effort we put forth to obtain a satisfactory job success definition we should have done more to insure its use.

In particular, the rating judges should have been made more aware of our concern with the overriding importance of the protectiveness of the employment situation. As Chapter IV shows, degree of protectiveness came to be considered by us the most basic factor in determining the job success of retarded persons, subordinating all others such as pay, length of time on the job, etc. Efforts were made to indicate to the judges involved the importance of this factor, but an after-the-fact review of their job success ratings revealed that the staff differed with the judges in the ratings of many of the sixty subjects. This difference was usually in the direction of the judges "over-rating" subjects the staff felt to be working in protective circumstances; for example, at Goodwill Industries and part-time baby sitting jobs.

Though this weakness in the experimental design did not become apparent until it was too late to revise the techniques used with the validation group a new rating questionnaire was developed for use with the cross validation group. This rating form overcame the difficulties encountered earlier by giving the judges more concrete choices to select in a short multiple choice form. In fact the use of this new form reduces the "judge" to the role of informant with the information he provides being transferred to the rating scale by the research staff. A copy of this form can be found in the appendix.

Although the decision was made ex post facto, it was considered desirable by the staff that a second analysis of the predictive powers of the Laradon battery should be made using only a select subgroup of the original validation population. This subgroup consisted of those who remained after eliminating those whose job success rating was questionable on the basis of the problems mentioned above. Figure 7-2 shows the increased relationship between test performance and Job Success Rating for the 33 members of this select subgroup.

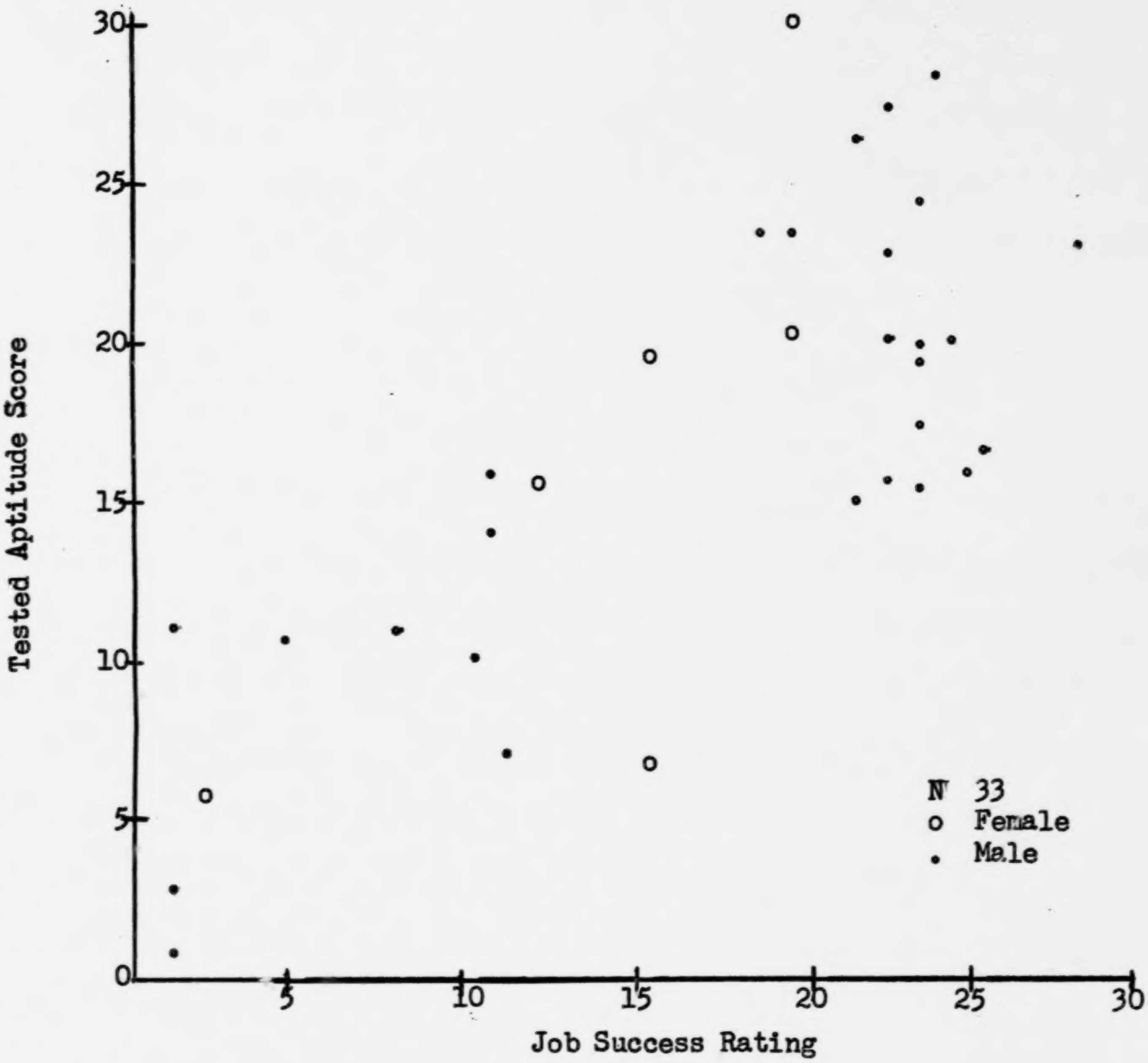


Figure 7-2: Distribution of tested aptitude scores as a function of job success ratings for a select validation subgroup of thirty-three subjects.

A regression analysis yields a multiple R of .85, a marked increase over the multiple R obtained on the validation group as a whole. These results suggest that the use of a broad battery of tests such as those utilized in the Laradon Occupational Success Predictive Battery can effectively indicate potential job success if the subgroup of retarded persons to which it is applied is carefully limited.

For cross-validation purposes it is desirable to use a population that approximates or resembles the original population very closely in terms of the criteria used in selecting the group. In our situation this would mean including only those retarded young adults who could meet the criteria described in Chapter III. That this goal was not practical can be appreciated by recalling our difficulty in obtaining the original 60 subjects for the experimental battery. In the present chapter we have shown, also, that even these 60 were not entirely satisfactory for consideration as a group. Consequently, instead of doing an actual cross validation it was decided simply to check the predictive power of the Laradon Battery with two somewhat different though still appropriate populations.

The first population came from the Denver Public Schools graduating class in special education. These persons were presumably at the end of their formal training and would soon be leaving school to seek employment in the community. Although this group differs from the original 60's criteria of having at least one year of job exposure at the time of testing, theoretically they would still have had approximately that much exposure when their Job Success Rating was obtained nearly a year later. We learned, however, that completion of the special education does not mean the individual necessarily will enter the labor market right away. Nearly half of the Denver Public School subjects tested had no job experience of any kind whatsoever, approximatel one year after testing. This is not to imply that these subjects were simply sitting at home doing nothing, for most of them were in the job corps, anti-poverty program or some other continuing training program. Nevertheless, these subjects were not exposed to employment during the period of this study and therefore could not be used in evaluating the Laradon Battery.

The second population was obtained through the two State Home and Training Schools at Wheat Ridge and at Grand Junction, Colorado. We were aware that introducing an institutional factor would affect the predictive power of the Laradon Battery, but it was thought that it would be of interest to demonstrate what that effect would be. Table 7-1 shows the distribution of the subjects by their source and their usability.

Table 7-1

Distribution of Subjects Tested From
Various Sources, and Problems in Their Usability

		UNUSABLE		QUESTIONABLE USE	USABLE
Source	(Total Tested)-	(no job exper.) -	(unlocated)	(protective only)	Remainder
Public School	23	9	4	2	8
Wheat Ridge	47	18	0	14	15
Grand Junction	12	0	0	11	1
TOTAL	82	27	4	27	24

Fifty-one subjects, who could be said to have had a ratable job experience were thus obtained. Their Laradon Job Success Predictive Battery scores were weighted and combined according to the multiple regression analysis of the performance of the original 60 subjects. Figure 7-3 shows these 51 subjects plotted on the coordinates of predicted job success and rated job success.

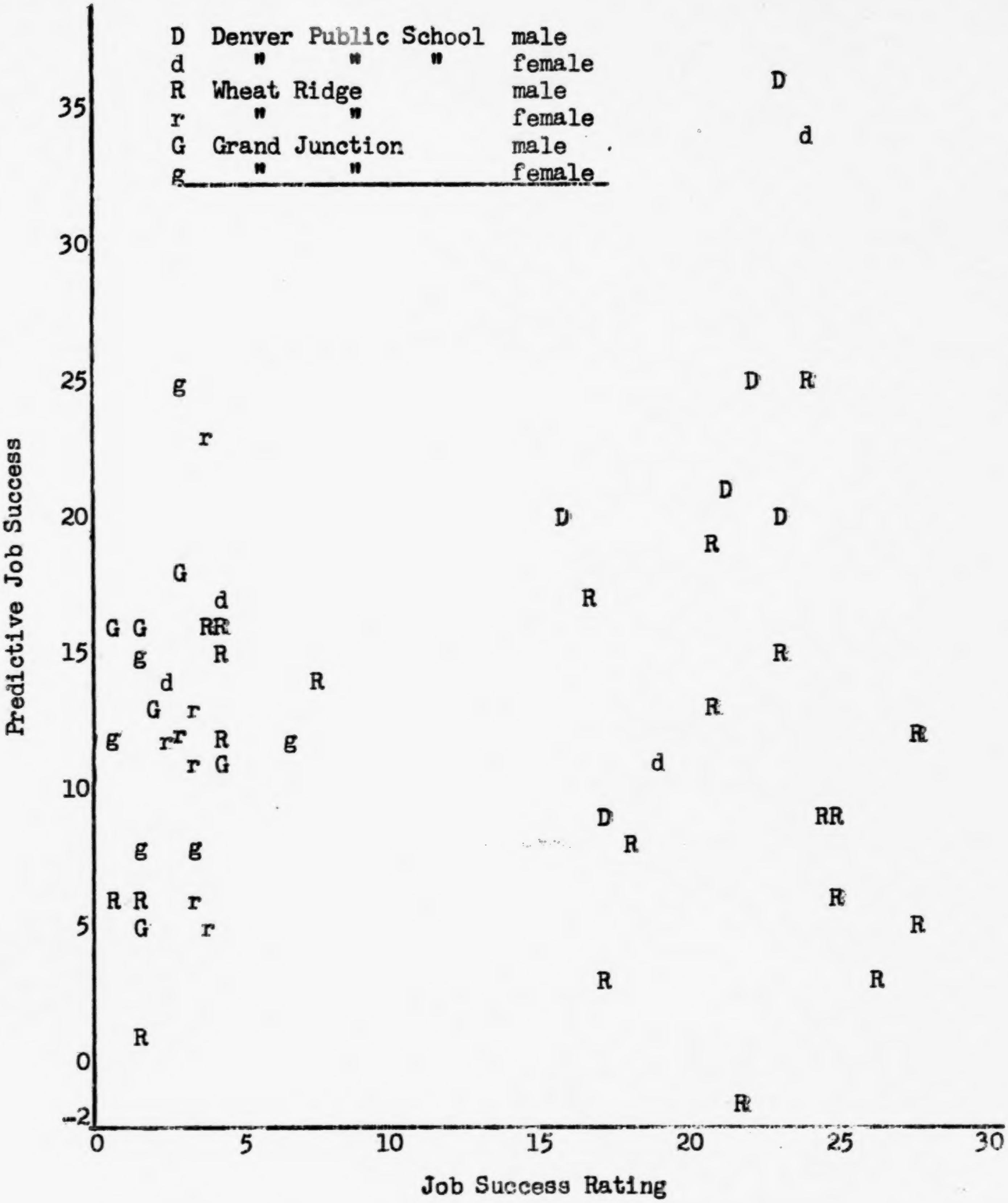


Figure 7-3: The actual job success versus the predicted job success of 51 additional subjects from varied sources.

Some of the findings that were noted in the analysis of the predictive power in connection with the 60 experimental subjects are supported by the data shown in Figure 7-3. This new group of subjects also reveals some new aspects not found earlier. These results can be summarized as follows:

1. In the subgroup (Denver Public Schools) which most closely resembles our original 60 subjects, there is a definite tendency for the predicted job success to correlate with the rated job success, indicating some validation of the predictions of the Laradon Battery. Unfortunately, the ten subjects of the subgroup are too few to be considered an adequate test of the battery. Also, there are not enough subjects who are rated job failures, probably because those who might fall in this category were eliminated as not yet having job exposure.
2. Sex is a confounding factor in studies of this kind. Fifteen out of eighteen of the female subjects received a rating of 5 or less, indicating their only job exposure to be in protective circumstances. It may be that institutional females have even less opportunity for competitive employment than non-institutional females have.
3. Institutional retarded persons are not within the predictive scope of the Laradon Battery in any way, suggesting that overriding factors other than aptitude must be operating. What these "institutional" factors are needs more thorough study.
4. The economic life of the community influences the kind of job exposure the retarded person can have. Wheat Ridge, located in the metropolitan Denver area, has been able to locate many competitive employment situations for its "graduates". Grand Junction, located in a smaller community in western Colorado, is largely dependent on protective and seasonal jobs in the local industry of agriculture.

At this point it becomes necessary to raise a fundamental question concerning conclusions that might be reached about this study on the basis of the results obtained. The most likely conclusion which will be drawn from this study is that the failure to obtain more definitive results stems from the fact that aptitude factors bear only a minor and insignificant relationship to job success and that the significant determinants of successful employment must therefore be emotional problems or character defects. It is our feeling that the justification for this conclusion is lacking and reflects a popular prejudice, perhaps the most popular in the fields of habilitating the retarded. There is no doubt in the mind of anyone who has labored in this field that emotional factors can be relevant to the employment problems of the retarded. The evidence is lacking, however, to support the notion that these are the only relevant factors or even the most significant. If this were so there would be no reason for not disolving the boundry between the mentally retarded and the mentally ill.

The legitimate conclusions that can be drawn from this investigation seems to us to be two. The first of these is that the employment of "blanket" testing techniques and factor analysis on a broadly selected population should only be undertaken if the population studied is large enough to be called truly representative. This is particularly so since the class, mentally retarded, inherently contains a great heterogeniety among its members. The second conclusion is that there is a need for a greater taxonomic effort in the area of the kinds of ability handicaps suffered by retarded persons. Work in this area has been impeded by a simplistic approach based on the origin of the defect rather than on the exact nature of the defect. The remedy for this lies in a more adequate theoretical groundwork such as that suggested in the work of Jean Piaget.

CHAPTER VIII

REMEDIATION

Piaget's theories and experiments have been a source of the inspiration for much of our work. Tests exploring his various stages of mental development were included in the experimental battery and some survived to be included in the final version of the Occupational Success Predictive Battery. In that first phase it might be said that some of the results of Piaget's work were used but were treated in other ways for other purposes, that is, factor analyzed to obtain common factors. Piaget's own developmental theory has not till now been used directly in our work but the remediation problem will be approached entirely from the point of view of Piaget's theory and concepts.

First it will be necessary to give a brief summary of some of the salient features of Piaget's approach in order to understand how we have applied it to the problems of remediation of the deficiencies of the mentally retarded. Flavell's recent book presents the best single overview of Piaget's position and provides a useful background for understanding our approach to the remediation problems. To expound Piaget's theory in detail would be an impossible task but we can specify a few of the major points that apply most directly to the problems of remediation and refer the reader to Flavell for more general background of the theory.

First of all, Piaget's theory is basically a developmental theory. He tells what the stages of mental growth are and in what sequence they occur. This developmental approach seems to be most promising for work with the mentally retarded since they have failed to learn, failed to develop certain skills. Rather than simply noting the lacks and deficiencies, a developmental theory can give some insight into the pattern of the deficiencies and hopefully offer guidelines for beginning an approach to problems of remediation.

The following diagram gives an outline of the stages of mental growth as postulated by Piaget.

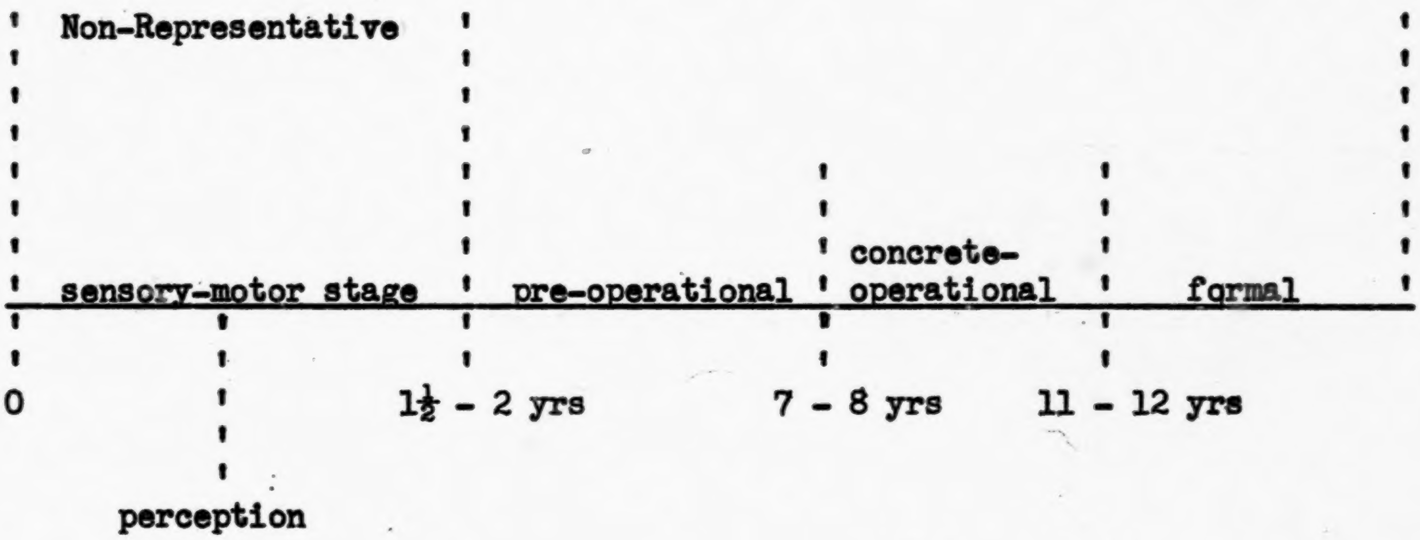


Figure 8-1. The Stages of Normal Mental Development According to Piaget.

The sensory-motor stage begins with the first inherited reflexes which are developed by experience and maturation into more complex habits. But they are all sensory-motor in nature because they involve direct responses to external stimuli, without any complex, intervening central activity. Though sensory-motor habits may become rather complex they do not involve memory images, deduction, anticipation, etc., all of which are more central types of processes. Perception is one large sub-type of sensory-motor behavior, because, as Piaget narrowly defines it, it consists of those sensory-motor schemas directly involved in the sense reception process.

As will be more fully elaborated later, this definition of perception as a sensory-motor process means that perception is not a passive process of automatically registering stimuli from without. Rather, it is an active process in which motor responses play as significant a part as the sensory receptor elements. In the case of vision, this is to say that the scanning process, by means of eye-movements is as an important a part of vision as is the retinal receptors, the shape of the eyeball, or the neural processes of the brain.

Around 2 years of age, the child begins to develop representational or symbolic processes and the remainder of mental growth consists of elaborating more and more complex symbolic systems. However, rather than simply dichotomizing behavior into abstract and concrete, Piaget distinguishes three levels of abstract behavior.

The pre-operational level consists of simple symbolic processes that are little more than symbolic actions. The child may not overtly respond with sensory-motor behavior but he "thinks" in terms of actions that he could perform. In this pre-operational stage, for example, words are defined in terms of what can be done with them, e.g., an orange is "to eat", the lowest level of definition on the Stanford-Binet. These symbolic representative actions offer some improvements over concrete actions, e.g., greater flexibility, greater speed, etc., but they are not yet organized into coherent systems so that thinking is full of contradictions, instabilities, and omissions.

Around 7-8 years of age, the representative actions achieve operational status by becoming organized into coherent systems. The child becomes capable of deductive reasoning and he can go rather far in "correcting" his sensory impressions in order to achieve some stability and coherence in his thinking. For example, he now can discern certain "constancies" in the world, certain properties that do not really change though they appear to, such as was tested in the conservation of substance and weight in the Experimental Battery. The remaining limitation on concrete operation is that they are effected only on perceptual input, that is, on concretely present situations. The concrete operational child cannot reason purely abstractly and purely logically in a verbal way.

These last features are acquired in the formal stage and subsequently e.g., beyond adolescence, the child certainly continues to develop and add to his repertoire of mental skills. However, Piaget does not consider that any fundamental new properties come into his thinking such as characterized the earlier stages.

This in brief is a sketch of Piaget's conception of the normal development of intelligence. We would like to use this scheme in order to understand the intellectual problems of mental retardation and to understand what has gone wrong in their development. Let us now attempt to analyze the results of the first phase work from this point of view in order to draw the implications for remediation.

As previously noted the aptitude factors seem to be most important for job success and they can be comprehended within the framework of Piaget's theory. As can be seen from the preceding section, Piaget does not deal with personality factors. In order not to be simply arbitrary about the exclusion of personality factors from consideration for remediation, we might point out that there seems to be a current tendency to consider personality predominant over aptitude. Our work has tended to focus mainly on aptitude, because many of the emotional problems of retardates can be seen to be reactions to their aptitude inadequacies. Therefore, while concentrating on the remediation of aptitude we do not feel we are ignoring personality completely since we would expect direct personality benefits to ensue from improvements in aptitude.

The aptitude factors suggested by our work as being significant in job success seem to form a unit that can be systematically treated by means of Piaget's developmental theory. The *motor factor* and the *reasoning factor* can be conceptualized as falling, respectively, into Piaget's *sensory-motor* stage and his *concrete-operational* stage of mental development. The results of the Equilibrium Balance Test in the Experimental Battery show that none of the retarded, even the most vocationally successful reach Piaget's highest stage, i.e., the formal operational stage, so that our remediation efforts can justifiably begin with the lower levels of intellectual functioning. The age levels associated with these stages also match the mental ages of the retarded subjects, e.g., IQ 80= MA 12.8, IQ 50 =MA 8, approximately.

In particular, when we note that arithmetical ability is important for job success we wonder how to utilize this fact for remediation purposes. Should arithmetic simply be taught directly or does the absence or presence of arithmetical ability only serve as an index of some more basic organic condition? We favor the latter possibility since practically all of our subjects had considerable exposure to school subjects in special education. It seems to be a case, therefore, of the teaching having "taken" for some and not "taken" for others. Therefore, rather than attempting to simply repeat special education arithmetic in an attempt to remediate the vocational unsuccessful we first attempted to analyse what the finding of the first phase might mean in terms of Piaget's theory.

Arithmetic, on the level tested in the Experimental Battery, is a concrete operational skill. Other, more direct, tests of this level of thought are the Conservation Group and they also appear in this factor which suggests, in Piagetian terms, that it is the possession of concrete operational skills which is the crucial characteristic of vocationally successful retardates, rather than arithmetic per se. Therefore we must consider how Piaget conceptualizes concrete-operational abilities to develop. Unfortunately, Piaget has done little or no work on this topic and his treatment deals with the development from stage to stage primarily in a descriptive fashion. He does not deal with ways of manipulating development and in particular he does not deal with failures of development. However, others, such as Smedslund (36), have done direct work on teaching certain concrete operational reasonings such as the conservation concepts. Their findings imply that training on the concept, as such, runs danger of teaching only a rote, verbal response that is not as useful or as meaningful as the fully operational ability. Training on lower level, component responses, e.g., in the case of conservation, training on adding and subtracting parts, gives the best results in achieving concrete operational skills. Thus we concluded that an initial remediation effort should focus on lower level skills than the level of concrete operations.

An additional line of evidence favoring this decision is found in the other results of our work. The other main factor associated with job success was interpreted to be a motor factor. The motor tests used in the Experimental

Battery would lie on the level of sensory-motor behavior, in Piaget's general scheme. They thus constitute component behaviors below the level of concrete reasoning.

Analyzing Piaget's sensory-motor level, shows that, as the term itself indicates, that there is a sensory, or receptive-perceptual, part, and a motor or effector part to each such behavior. Much previous work emphasizes perceptual problems as the key to the disturbed functioning of brain-damaged individuals, which also includes the mentally retarded. Some of Piaget's perception tests were included in the investigation battery and while the results were not of a type to warrant their inclusion in the predictive battery, they did show a definite developmental trend. That is, failure on the perceptual tests precluded other higher level developments though success on the perceptual tasks did not ensure that the higher level functions would be mastered. This is a very typical result when relations between developmental traits, such as Piaget deals with, are studied. For all of the above-discussed reasons, we chose to focus our initial remediation efforts on perception.

For suggestions as to how to approach the problem of the remediation of perception we took a leaf from Piaget and employed his celebrated "genetic method". That is, we presented the same perceptual tasks to normal children of different ages, and to a retarded population. By this time we were able to attempt to improve on our original Experimental Battery tests so that improved versions of the perceptual tests were employed in order to better study the course of normal development of perception.

The subjects used were 96 normal children obtained from local schools, distributed as follows:

24 Kindergarten children	5-6	years of age
24 1st & 2nd graders	7-8	"
24 4th & 5th graders	10-11	"
24 High School pupils	16-17	"

These four groups were tested with some improved versions of perceptual tests modelled after Piaget:

A. The Muller - Lyer Illusion measured by two methods, the
Adjustment Method and the
Method of Constant Stimuli

B. Isolated Line Size Judgement - Adjustment Method

C. Concentric Circles Illusion - Method of Constant Stimuli

Since the remediation work was to be carried out entirely on trainees actually in the Laradon Occupational Center program, not with the experimental group from the community heretofore employed, these improved perceptual tests were administered to 60 mentally retarded trainees then enrolled at the center and their results compared to the normal groups described above.

The means presented in Table 8-1 show the accuracy of perception and the sigma's and zones show the variation or the instability of perception. The same data is presented graphically in Figures 8-1 to 8-8 following.

	Muller-Lyer Illusion Adjustment Method		Muller-Lyer Illusion Method of Constant Stimuli		Single Line Adjustment Method		Concentric Circles Method of Constant Stimuli	
	$\bar{M}$ PSE	$\bar{M}$ SD	$\bar{M}$ PSE	$\bar{M}$ Zone	$\bar{M}$ PSE	$\bar{M}$ SD	$\bar{M}$ PSE	$\bar{M}$ Zone
Kindergarten	41.33	4.18	46.70	5.25	44.96	3.56	23.28	1.75
1st & 2nd	43.90	4.35	45.62	5.83	46.64	3.78	23.25	2.08
4th & 5th	44.97	3.36	46.29	5.17	48.55	2.71	22.52	1.50
High School	44.73	1.97	47.73	2.71	48.69	1.73	21.98	0.83
Laradon trainees	45.12	4.02	47.39	7.23	46.15	3.72	22.87	2.23
Perfect accuracy	(50.00)		(50.00)		(50.00)		(20.00)	

Table 8-1. Group means for the various perceptual tests exploring perceptual development.

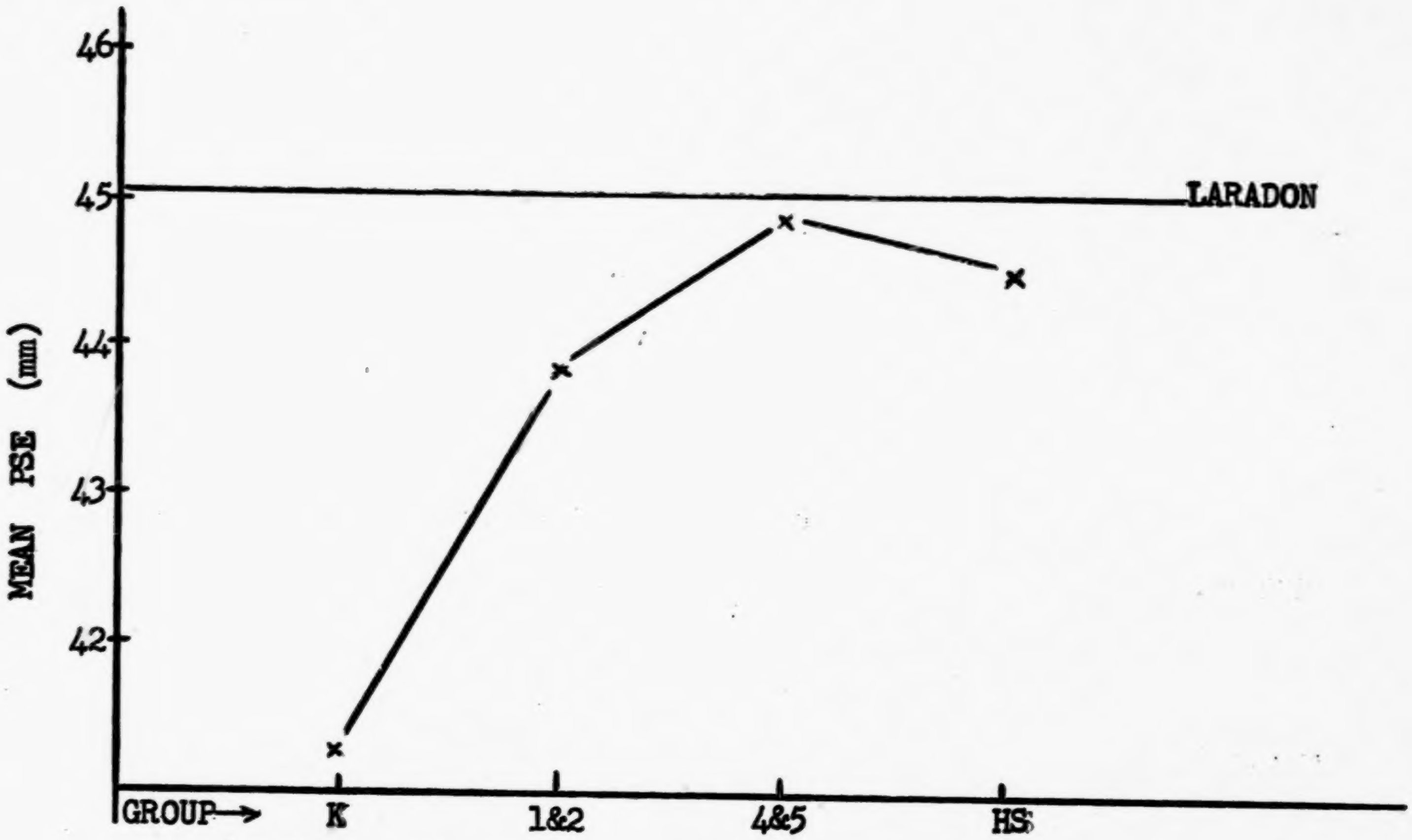


Fig.8-1 Muller-Lyer Illusion Adjustment Method - Developmental Curve of Illusion (PSE).

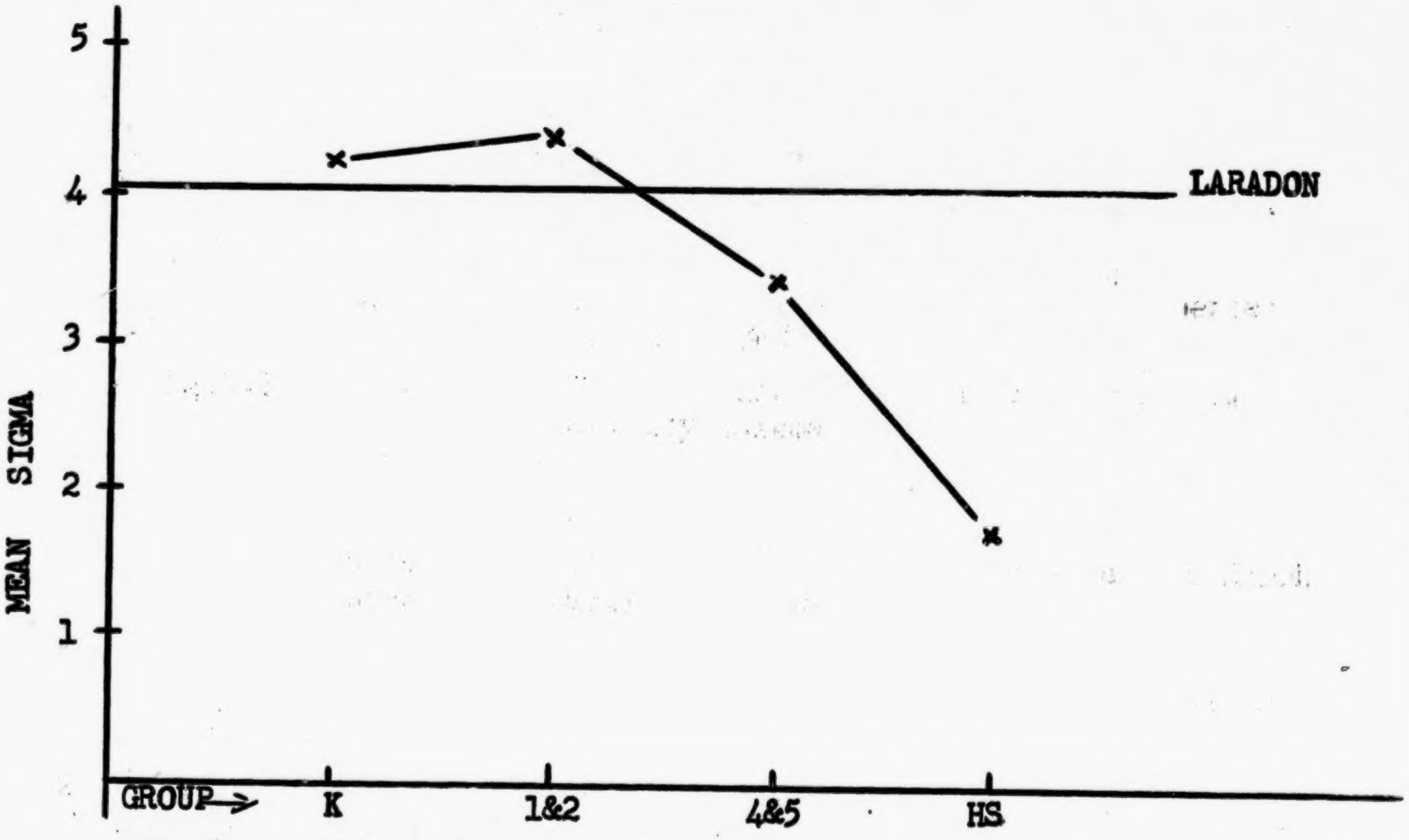


Fig.8-2 Muller-Lyer Illusion Adjustment Method - Developmental Curve of Instability (Sigma).

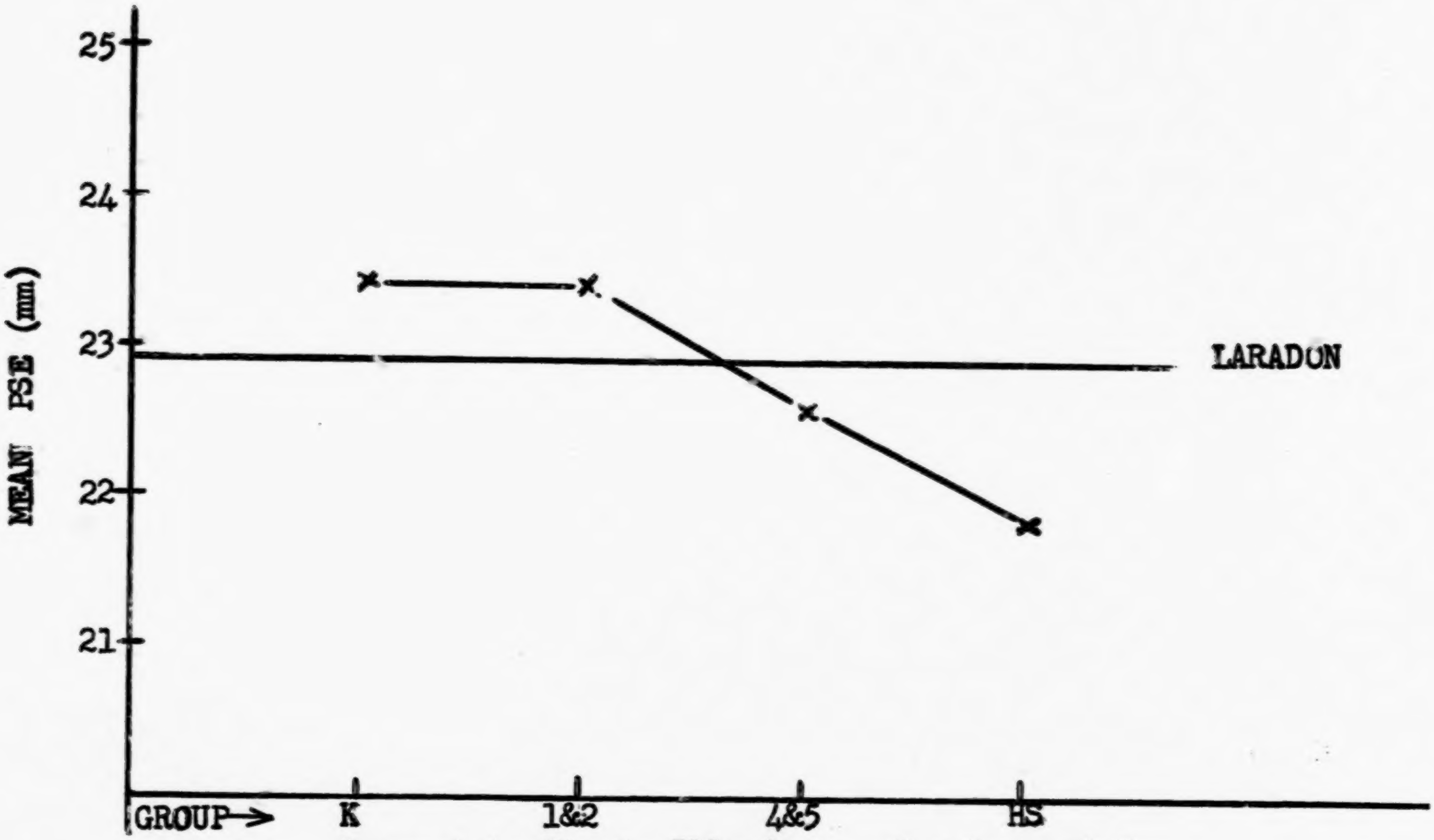


Fig.8-3 Concentric Circle Illusion — Developmental Curve of Illusion (PSE).

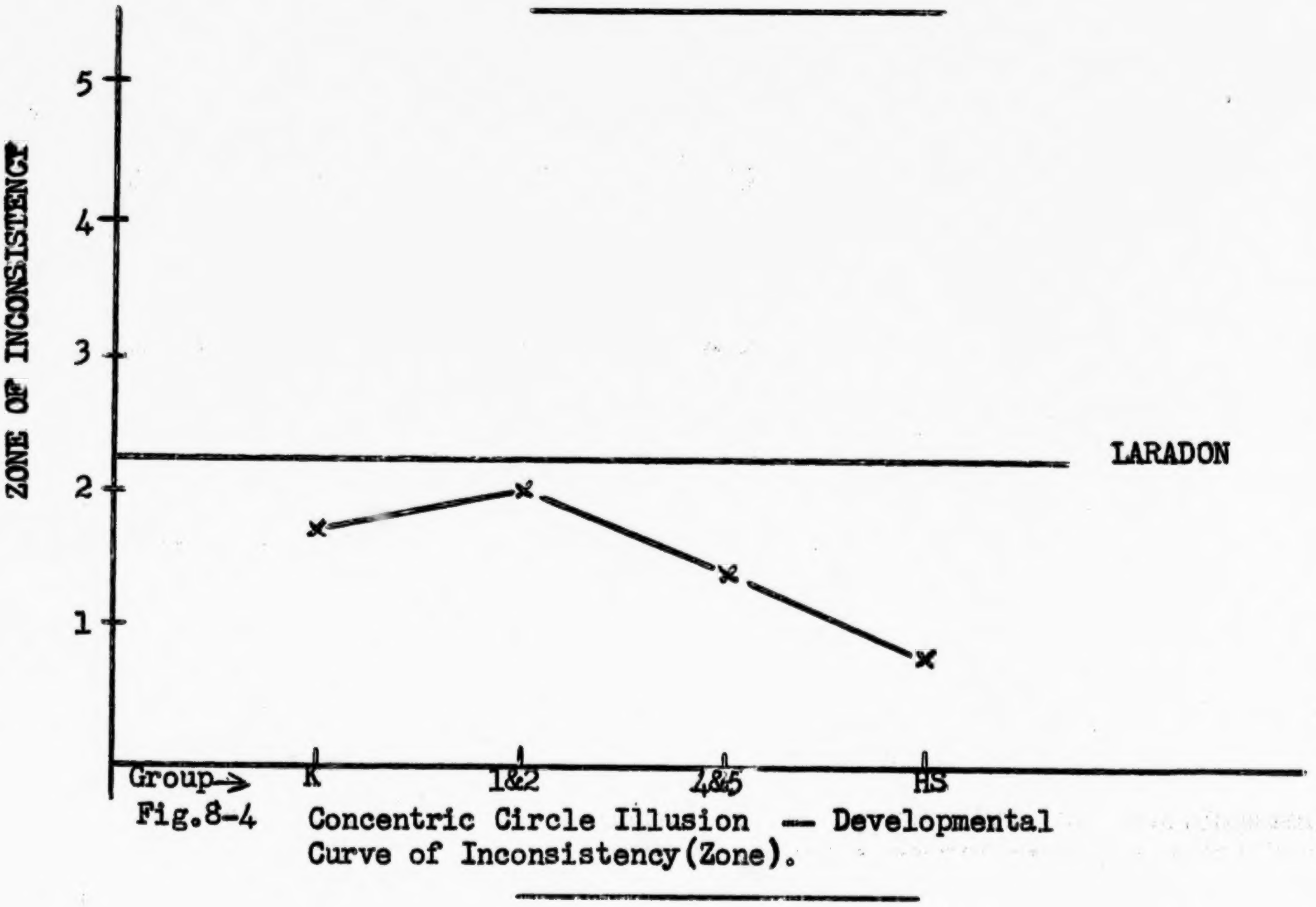


Fig.8-4 Concentric Circle Illusion — Developmental Curve of Inconsistency (Zone).

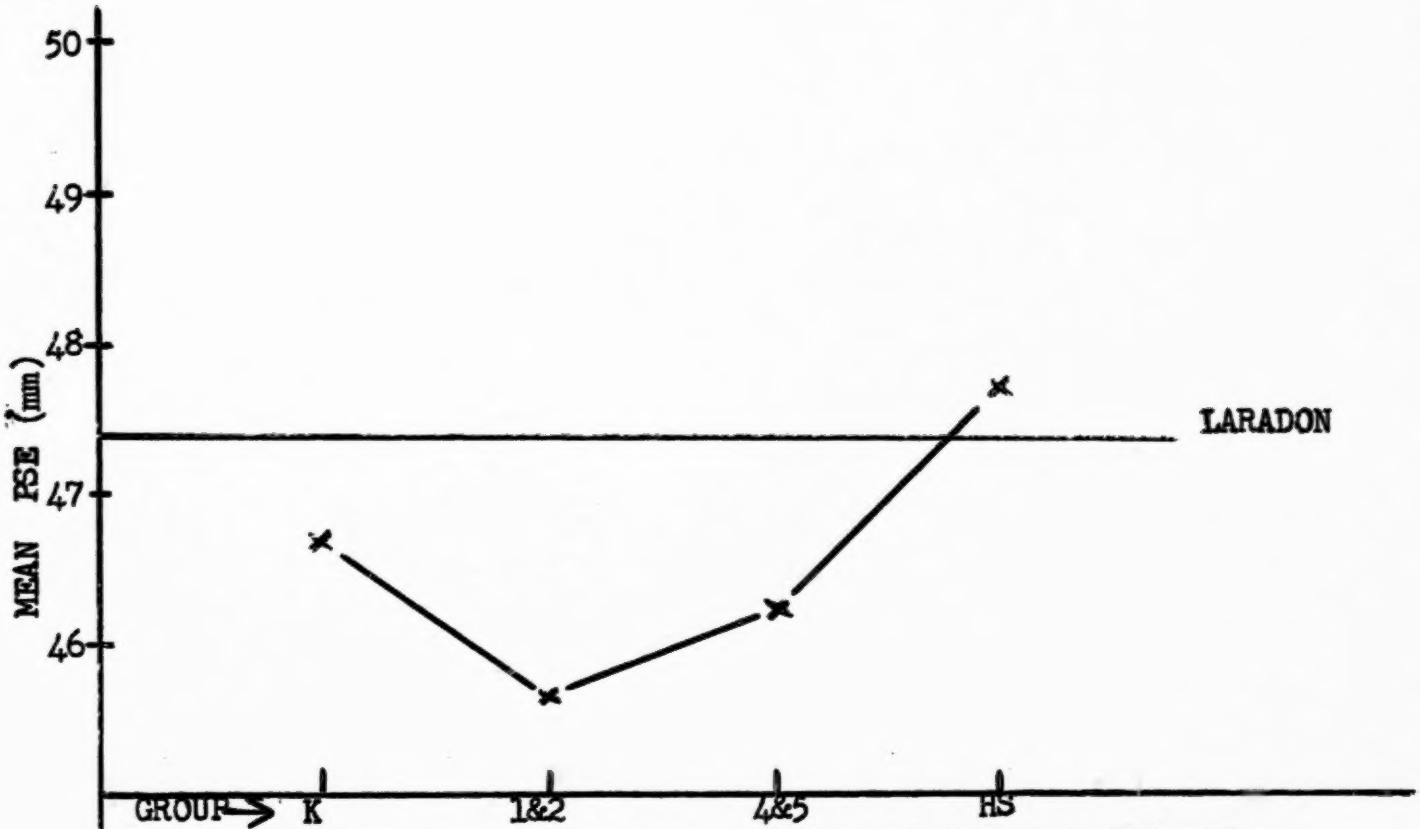


Fig.8-5 Muller-Lyer Illusion - Method of Constant Stimuli - Developmental Curve of Illusion (PSE).

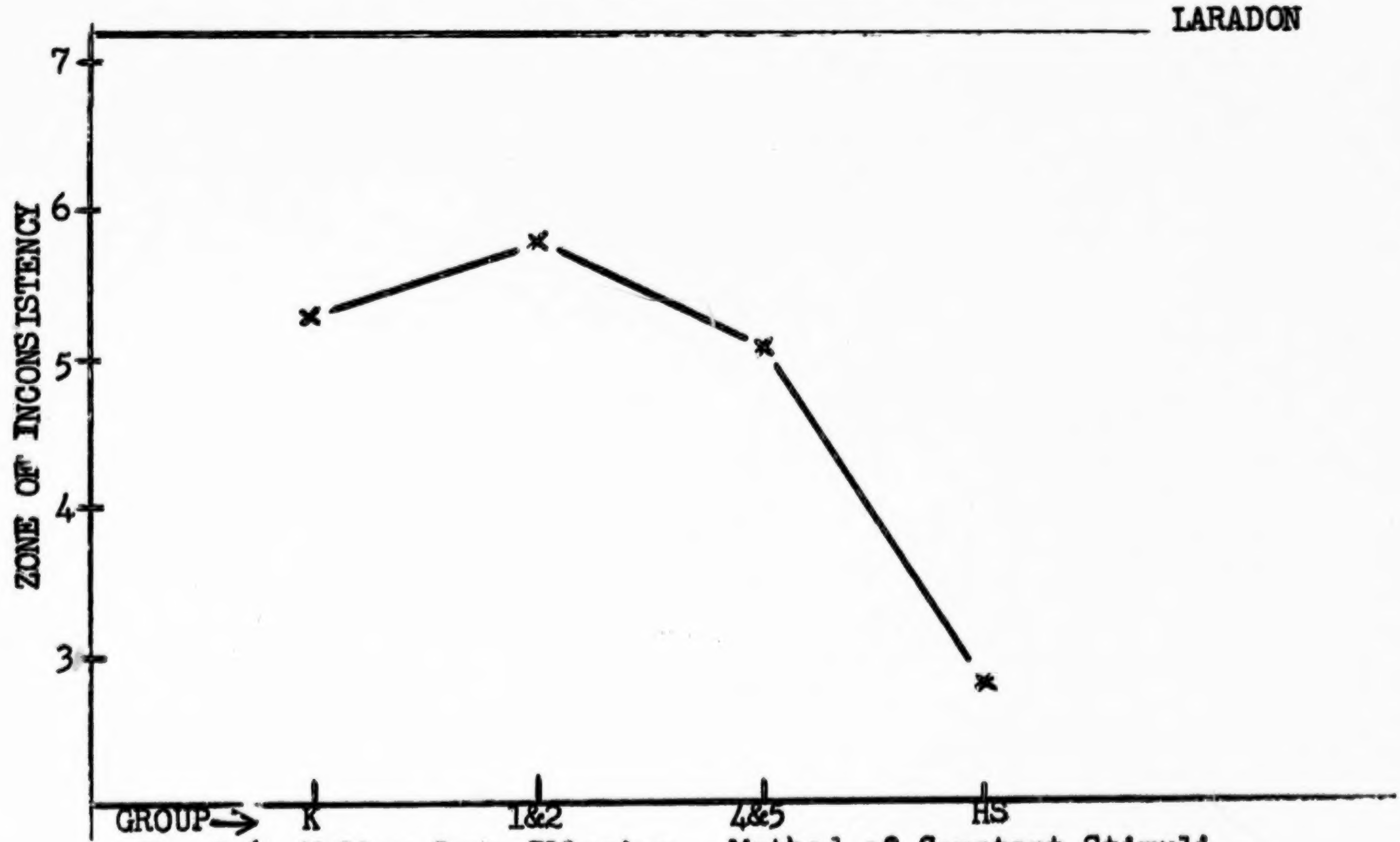


Fig.8-6 Muller-Lyer Illusion - Method of Constant Stimuli - Developmental Curve of Inconsistency (Zone).

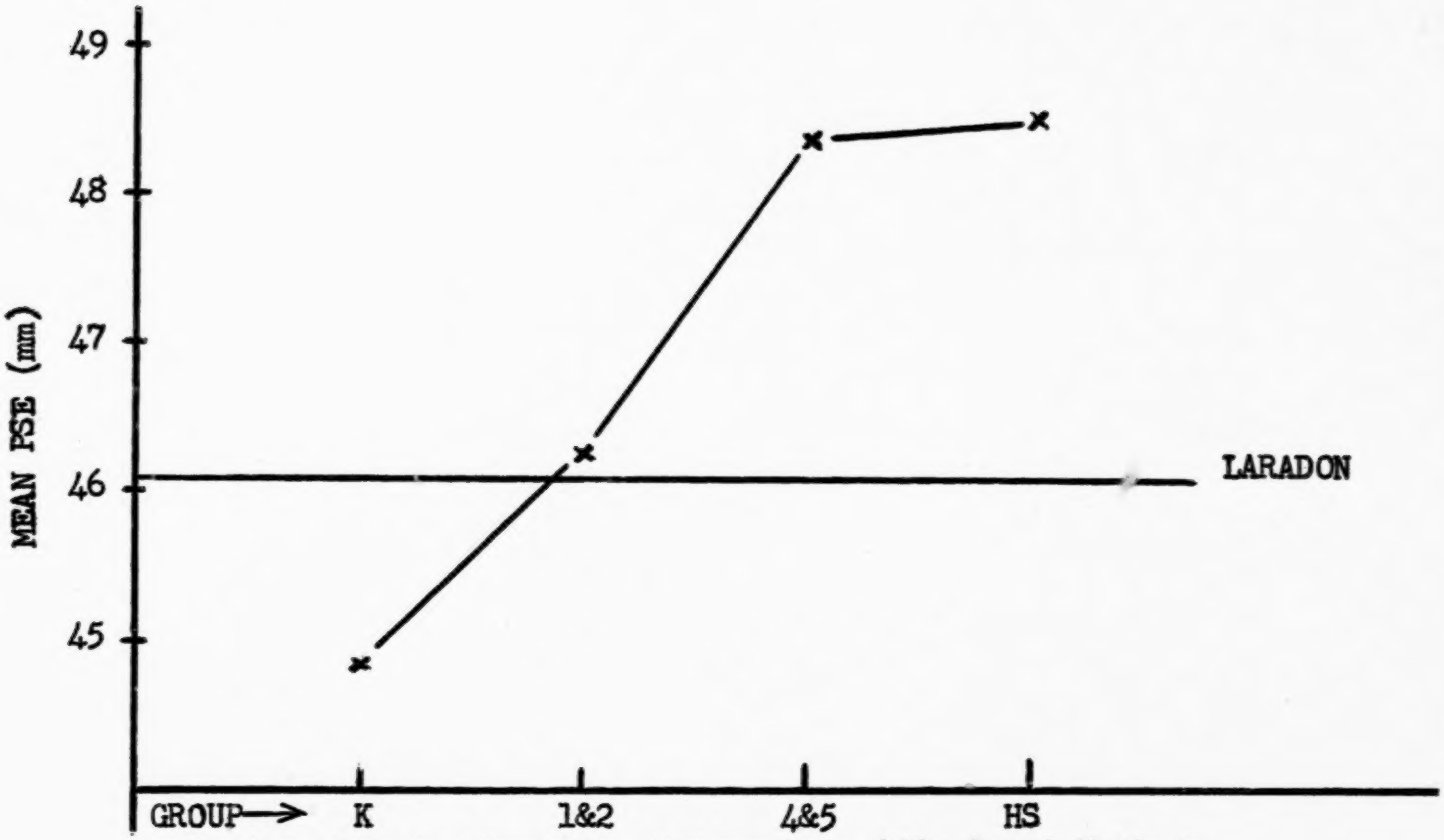


Fig.8-7 Single Line Size Judgement - Adjustment Method
Developmental Curve of Accuracy (PSE)

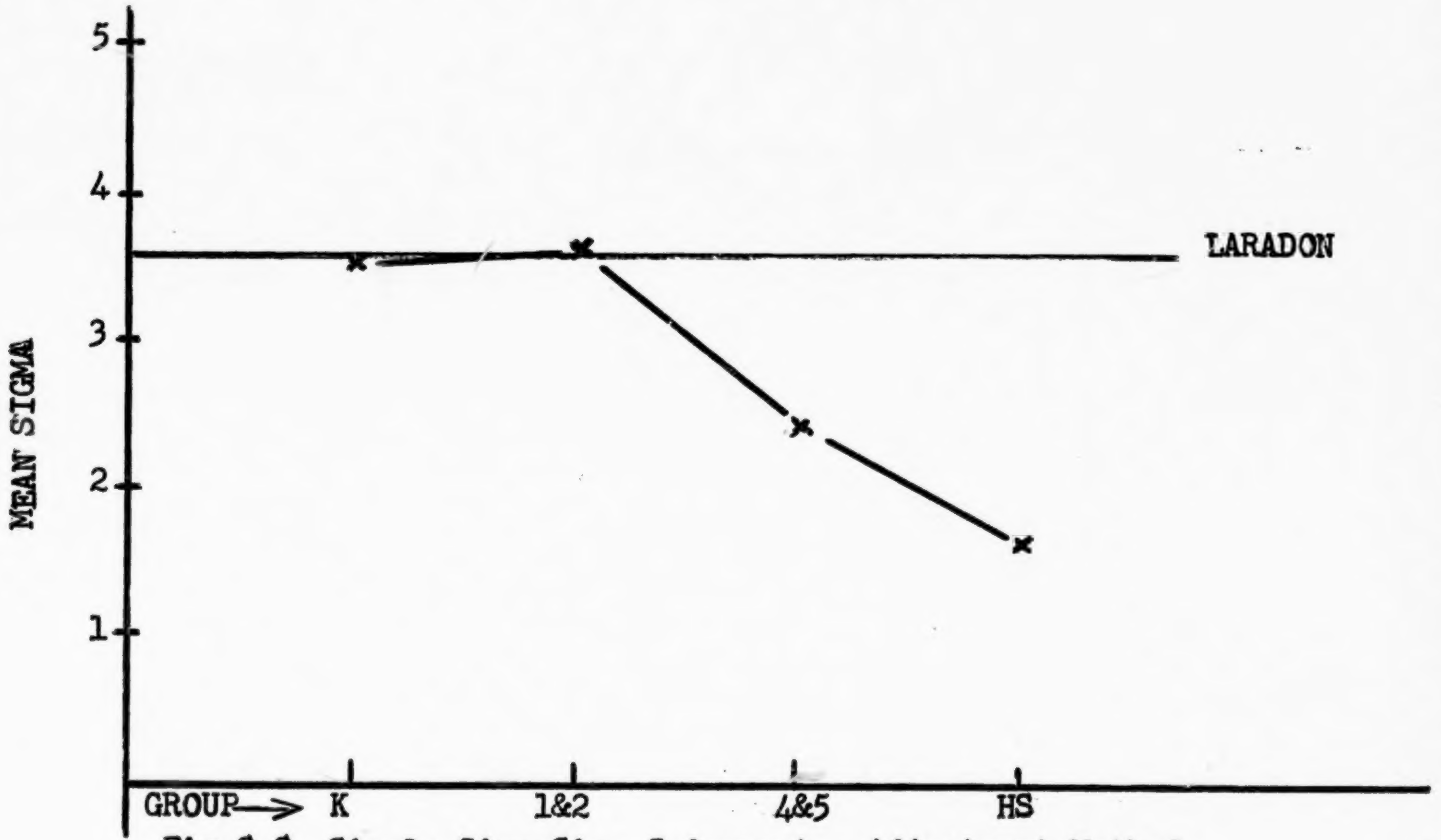


Fig.8-8 Single Line Size Judgement - Adjustment Method
Developmental Curve of Inconsistency (Sigma)

The general trend of the results shown in Table 8-1 and in the graphs is to confirm Piaget's usual results, namely that perception becomes more accurate and more stable with age. Susceptibility to optical illusions decreased with age and consistency of perception increases. There are several irregularities in the table but the main conclusion as to the over-all developmental trends seems clear enough.

As for the retardates, the group of 60 tends to perceive inaccurately in a fashion similar to the younger children, except for an apparently reduced susceptibility to the Muller-Lyer Illusion. This reduced illusion effect has been analyzed as spurious and actually is due to the operation of other primitive perceptual processes which confound the simple measurement of the illusion effect. Such confounding did not occur with the Single Line or the other illusion, the Concentric Circles Illusion, where the retardates showed up as immature.

Even more pronounced immaturities are seen in the inconsistency measures (sigma's in the case of the adjustment methods and the zones in the case of visual choice tasks.) The mentally retarded show more deviation in terms of their inconsistency measures than they do in terms of accuracy, relative to the normal groups. They seem to be more unambiguously deviant from normal perception in terms of instability than in terms of accuracy.

Table 8-1 and the associated graphs show only the groups trends. Apart from various criticisms that have been made of grouping data and dealing only with group statistics we feel that in the case of the mentally retarded there is so much individual variation that if the analysis is confined to grouped statistics alone, more violence may be done to the individual than ordinarily might be the case. Thus, we can look at a few graphs showing the range of individual differences among retardates and among the High School and the Kindergarten normal groups for comparison. Figures 8-9 to 8-11 shows the groups results for the sigma's of the two adjustment tasks, the Muller-Lyer Illusion and the Isolated Line. As can be seen the retardates are extremely heterogeneous. Some score as consistently as any of the normal teenagers and thus there would appear to be no perceptual disturbance in such subjects. Other retardates score more inconsistently than any Kindergarten subject and consequently must have a severe perceptual disturbance. All degrees of disturbance exist between these two extremes. Graphs for accuracy and on the other tests show similar distributions as those for the two adjustment sigma's presented. To more precisely assess the degree of perceptual disturbance by this genetic method we would need to have better samples, more representative, etc., than we were able to obtain at this time. However, we can say that some definite and severe perceptual pathology does exist in the trainees of the Occupational Center.

The major purpose in determining the existence of the perceptual pathology by the genetic method, however, was in order to discern what the reason for the deficit was in order to guide remediation efforts. If the problem were simply treated as a difference between occupationally successful and occupationally unsuccessful we would not know what such a difference meant and consequently could not approach the remediation problem in a systematic, insightful manner.

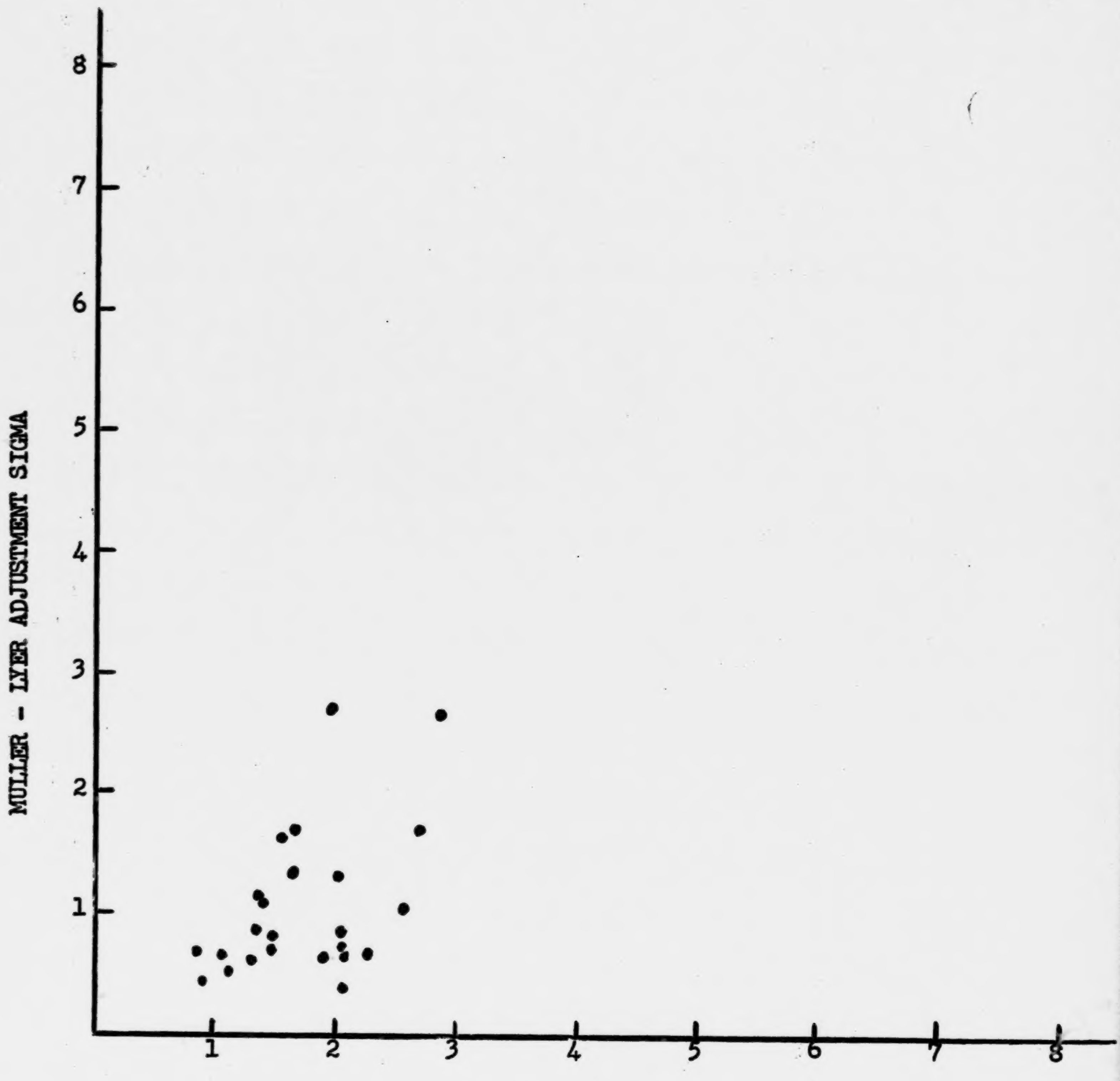


Fig.8-9 Relationship of Inconsistency Measures in the two Adjustment Tasks - Muller-Lyer Adjustment Sigma and Single Line Size Judgement Sigma.

HIGH SCHOOL GROUP N: 24

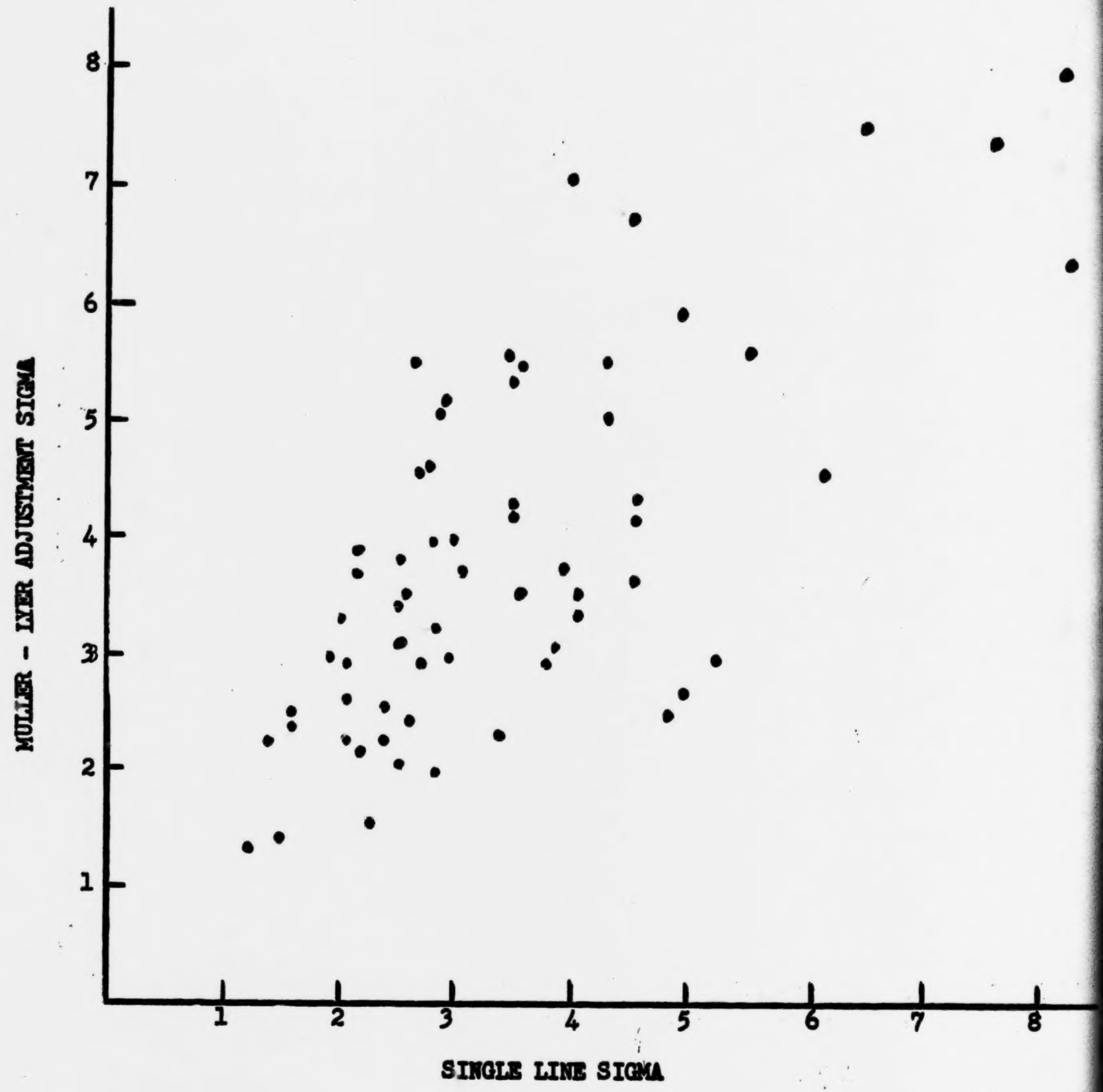


Fig. 8-10 Relationship of Inconsistency Measures in the two Adjustment Tasks - Muller-Lyer Adjustment Sigma and Single Line Size Judgement Sigma.

LARADON GROUP N: 63

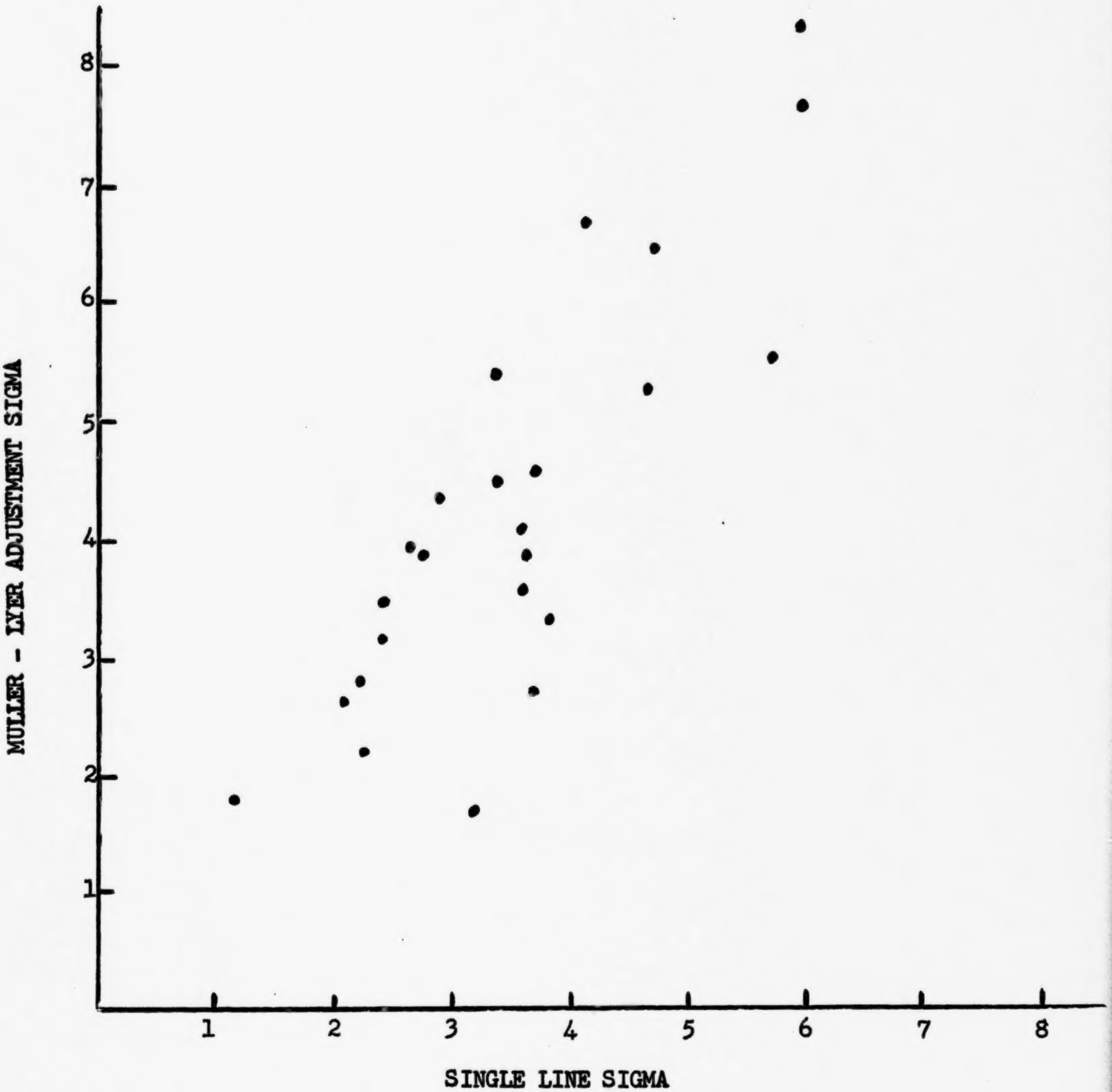


Fig. 8-11 Relationship of Inconsistency Measures in the two Adjustment Tasks - Muller-Lyer Adjustment Sigma and Single Line Size Judgement Sigma.

KINDERGARTEN GROUP N: 24

By a thorough application of Piaget's theory and an intensive analysis of the details of the experimental results just reported, we arrived at the conclusion that one of the major observable perceptual deficits of the mentally retarded lay in inadequate visual scanning of the stimulus. Direct observations of the scanning patterns of retardates when making visual judgements of size was attempted by means of taking motion pictures. Numerous technical problems were encountered so only some suggestive pilot data was obtained. It showed that subjects differed in the degree to which they looked back and forth between two stimuli that they were comparing and the amount of this scanning seemed to be correlated with the accuracy of their resulting judgement. Suffice it to say that further work is necessary to support our conclusions but they give a promising and fruitful basis for beginning the remediation of perception.

Looking back to the graphs in Figures 8-9 to 11 showing the inconsistency of perception in the retardates, the High School normals and the Kindergarten normals, we hypothesize that it is the development of more active and systematic scanning patterns that cause perception to become more stable and consistent with age. Some of the retardates have fully mature perceptual scanning abilities but the graph shows that most do not and some are as inconsistent and unstable as normal 4-5 year olds. Why they have not developed beyond this level is a topic for speculation and further research but we should now like to tackle the problem of whether or not their perceptual scanning can be improved through training.

To work on this problem more direct tests of scanning behavior were devised. Basically the new tests consisted of determining where an arrow was pointing and the subject's errors were quantitatively measured and used as an index of his scanning ability.

Test 1 - Single Arrow - simply required the subject to choose which mark on the circumference of a disc that a central arrow was pointing to as illustrated in the following diagram:

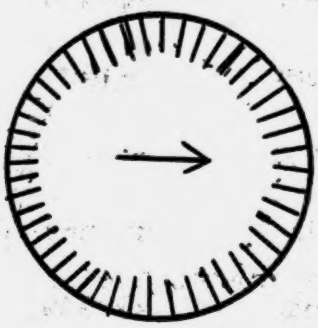


Fig.8-12

The task was presented varying the size of the central arrow and the distance over which the subject was required to scan, and, as would be predicted from the scanning hypothesis, these variables had the expected effect in that errors decreased with a larger arrow but increased with greater scanning distance.

Test 2 - Double Arrow - required the subject to determine where two arrows were simultaneously pointing, as in the following diagram:

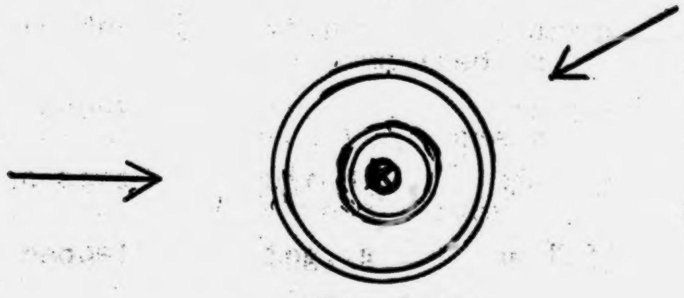


Fig.8-13

Various arrows in various orientations were presented and the subject's accuracy could be measured quantitatively by measuring the distance from the correct point.

These two new tests, more direct tests of scanning, proved to correlate well with the tests employed in the first experiments, .734 and .642 respectively with the single line adjustment sigma scores for example, so we have some communality among the measures which we interpret as due to the role of scanning.

Piaget considers Gestalt perception to be also a manifestation of scanning, as well as susceptibility to optical illusions and size judgements. To test this aspect of perception in connection with remediation an improved version of the Entrecroise figures test was employed. This test measures how well a subject can complete the Gestalt when incomplete figures are presented as in the following figure:

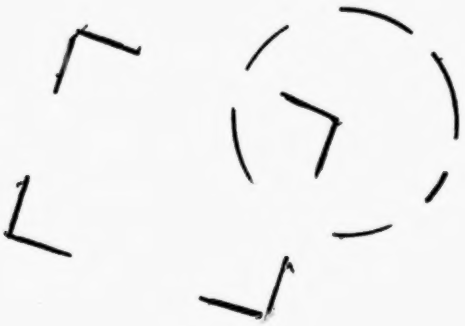


Fig. 8-14

All of the figures presented were quite easy for normal adults but again a wide range of individual differences were found in the mentally retarded group.

Now, Piaget's theory holds that the ability to see these incomplete figures as wholes is dependent on scanning activity. The child scans around the circle even though only a few arcs are presented and thus he generates the perception of the whole circle through his scanning activity. If he does not scan around the circle, connecting the arcs, then he perceives only fragments and he does not relate the pieces into a total, unified perception. With time and development, a perceptual schema is built up whereby the perceiver need carry out less and less of the actual perceptual scanning in order to generate the Gestalt, up to the point whereby the adult can perceive incomplete figures as wholes in an instantaneous manner. But this ability develops through the exercise of scanning activities and undergoes a long developmental history.

We would expect that the two basic scanning tests, the Single Arrow and the Double Arrow, would correlate to some degree since Piaget hypothesizes that scanning activity is involved in both. Significant correlations were in fact obtained as shown in the following table:

Table 8-2

	Incomplete Figures Test
Single Arrow Scanning Test	.270
Double Arrow Scanning Test	.371

Though significant, the correlations are small and in looking over the scatter plots we found that there was one group of subjects that contradicted the direct relationship that was postulated. There were subjects who could scan well, as measured by the two "arrow" tests, but who did very poorly in completing the Gestalts of the incomplete figures test. There were practically no subjects who did not scan well yet who could complete Gestalts. We therefore hypothesized that we had subjects who though possessing the basic scanning abilities had not developed them into good perceptual schemas. However, they should be more easily developed in these subjects than in those subjects who did not scan well on the basic arrow tests.

In order to test these hypotheses about remediation of perception we selected two groups of retarded subjects:

Group I. Good Scanners (measured by the "arrows" test) N:15

Group II. Poor Scanners N:10

(In addition there was a group of good scanners who also had good Gestalt perception but these subjects are not of interest to a remediation experiment. And as mentioned above there were practically no subjects who were poor scanners but good in Gestalt perception.)

Both groups, after the pretesting were given identical instruction in Gestalt completion, through the use of models and demonstrations, plus opportunity for practice. Then the original Entrecroise Figures test was readministered as a post-test. The data are presented in the following table:

Table 8-3

	Single Arrow Scanning	Double Arrow Scanning	Entrecroise Test		Improvement
			Pre-Test	Post-Test	
Group I - Good Scanners -	40.33*	45.40*	5.67	26.26	20.59*
Group II- Poor Scanners -	60.70*	129.20*	3.90	14.60*	10.70

* Indicates differences between the two groups that are statistically significant.

While both groups showed some improvement, the good scanners showed much more benefit from the training. We interpret this result to confirm Piaget's general theory of perception, particularly his theory of form perception. The learning of schemas of geometrical forms came much easier for those subjects who could already perform accurate scanning movements. Those subjects who could not scan accurately could not learn the schemas as readily. More intensive training on scanning might be expected to be of benefit to even the poorer scanners and we hope to pursue studies of this type. Unfortunately, we were not able to in the time available.

Furthermore, we were not able to ascertain whether this perceptual improvement resulted in better general workshop performance. The whole problem of remediation proved to be too vast and to depend on the solution of so many preliminary problems that only a bare beginning could be made within the scope of the present project. However, the use of Piaget's theories and methods proved fruitful in these preliminary efforts and we feel that they warrant a full scale application.

CHAPTER IX

REVIEW OF LITERATURE

The importance of vocational habilitation to the more general adjustment of the mentally retarded has been traditionally accepted, and Windle (42)* confirms this. The causes of vocational failure or success take on added meaning. Poor work performance (in contrast to social immaturity, lawbreaking, etc.) appears to be an important cause of failure, varying from a "major cause" (Tizard, 41) to the leading cause with 30% failures attributable to it (Windle, 42), 37% (Craft, 11) and 26% (Collman & Newlyn, 9).

That IQ is not generally a valid guide in predicting vocational success has been reported by Cowan & Goldman (10), Tizard (41), Bower (4), Pinkard (32), and Appell (1). Others have found significant correlation between the WAIS Performance IQ and vocational success (Tobias & Gorelick,39), though no significance was found with the Verbal or Full Scale IQs. Madison (27) found that while standardized IQ tests were not significantly related to job success, an intelligence "classification" by raters was!

While it contributes nothing meaningful to the discussion it should be pointed out that significant correlations between IQ and vocational success could easily have been demonstrated by the methodological expedient of extending the intellectual range of the subject sample downwards as close to zero as possible; since the vocational success of the more severely impaired is easily low, the correlation must improve. What the studies show is that limiting the intellectual range of the subject sample to the educable levels (which extremes are recognizable to casual observation), no significant correlation with general intelligence is demonstrated.

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*Parenthetical numbering refers to bibliography references - pages 85-87

From a slightly different approach, the same point, that IQ is not a valid guide, is made by Kennedy (24) and Collman & Newlyn (9) who found trainable-level retardates making successful vocational adjustment without protective supervision.

Because of the puzzling relationship tested I.Q. has toward work adjustment with retarded, its crucial importance in diagnosing retardation, and the implication that any remediation of retarded subjects must deal with intellectual capacities in some way, we felt justified in researching outstanding intelligence theorists to see if any of their concepts might have some utility in our investigation. Here we considered both genetic-developmental theorists as Piaget (15), as well as factor-derived theories (Cattell, 5; Guilford, 19; Thurston, 38).

An early problem to investigate was whether there was only one "general" intelligence or whether there was justification in thinking that intellectual capacities would be validly thought of as a number of separate factors, each representing a different---and largely unrelated---capacity. If the latter were found to be true, it might contribute considerably in clarifying new strengths and limitations of existing intellectual assessment methods. Humphreys (21) demonstrated rather well that the number of factors composing intellectual functioning was related to what level of analysis on a generality or specificity dimension; if the tests to be analyzed are related to highly specific skills, numerous factors will be a mathematically necessary result of the analysis; if tests of very general skills are analyzed, few or even only one factor will result.

An important exception to this, however, appears to be Cattell's (5) bi-factor theory, where a conceptual distinction unrelated to generality-specificity is statistically demonstrated and is preserved to the 3rd or 4th order of factoring. Our results suggest that this distinction is of great relevance to retardation. From the genetic-developmental orientation, Piaget (15) has provided some very provocative observations and some fertile theoretical integrations into how intellectual processes develop, combine, and give rise to higher level functions. Much of Piaget's theorization has generated testable hypotheses; prominent among these are the experimental studies by Smedslund in concept acquisition in which he demonstrates the superiority of a type of "cognitive conflict" over reinforcement-type acquisition. Another student, Inhelder (22), has demonstrated the generalization of Piaget's early developmental sequences of normal subjects to severely retarded subjects. Lovell (26) has developed standardization of many Piaget tests in number and space, and carried out comparative studies between retardates and normals at different age levels.

Vocational success prediction has been empirically attempted by many investigators. While one has attempted to predict permanent sheltered workshop adjustment (as against a combination of successful competitive placements and sheltered workshop "failures"), Katz (23) and another, Peck & Stephens (30), has found many work success factors in their study of retarded adjustment, most have been satisfied to predict to a criterion of work performance records or supervisors ratings in competitive or protective employment.

A tremendous number of variables have been correlated with these job success criteria in the hope that some valid empirical "indicators" might be discovered. Few investigators have given thought to investigating such correlations further in the hopes of uncovering "causative" components of job failure/success, which in turn might provide insight into the nature of job success, and how remediation might be systematically approached. The investigated variables have ranged from the demographic (socio-economic status, length of institutionalization, race, family data, etc.) to those from the subject (aptitude, emotional adjustment, social maturity, work attitude, appearance, etc.). The predictive studies considered are the following: Tizard (41), Bower (4), Pinkard (32), Peck & Stephens (30), Taylor (37), Tobias-Gorelick (39), Ferguson (14), Madison (27), Shafter (35), and Fry (18). In Chapter 8, these studies are comparatively discussed with the present findings with regard to a) variables investigated, b) criterion predicted to, c) populations investigated, d) variables found of predictive value, and e) the ultimate predictive efficiency.

In the remediation investigation, we have basically been interested in the "atomistic" approach of analyzing certain primary abilities that may have contributed an early developmental handicap to intellectual integration, thus introducing an increasingly confusing orientation toward later stimuli. For this area, we have been interested in perceptual functioning as described by Piaget (15).

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APPENDIX A

THE LARADON OCCUPATIONAL SUCCESS PREDICTIVE BATTERY

IPAT CLASSIFICATION TEST

MATERIALS

13 oversized cards, each with four smaller cards, record sheet.

PROCEDURE

Take demonstration set (spread small cards underneath the large card) and say, LOOK ON THIS BIG CARD THERE ARE SIX LITTLE CARDS, AND THEY ARE OF TWO KINDS.....THIS KIND (pointing) AND THAT KIND (pointing). HERE (taking extra cards from top) ARE SOME MORE LITTLE CARDS. IF THEY ARE OF THIS KIND (pointing to crosses) THEY MUST GO IN THE SPACE HERE (pointing). EACH GO WITH ITS OWN KIND. SEE, THIS GOES HERE AND THAT ONE THERE (placing cards slowly in position). NOW, YOU PLACE THE LAST ONE. GOOD. This is bound to be right, as there is only one empty space. THESE ARE ALL RINGS, AND THESE ARE ALL CROSSES.

Take the big cards in that order 1 - 12, Say, YOU CAN DO THE NEXT ONE ALONE, SEE, THERE IS THIS KIND AND THAT KIND. Point and do not give extra cards until S has studied the two sets.

After item I, say, YOU SEE THESE ARE ALL BIRDS AND THESE ARE ALL ANIMALS - correctly placing incorrect items. (Later items are not to be explained.)

We have found it helpful to vary the presentation position of the small cards in such a way as to minimize randomly correct responses. One strategy to employ in particular, besides that of varying positions, is with the harder items to accurately dramatize the position error that often develops by noting carefully the individual card positions of a missed item, and on the succeeding items presenting the next cards in such a fashion that if the S repeats this position response he will be totally wrong.

SCORING

Each of the four cards in each set must be placed in their proper columns for a "correct" response. The test score is the total number of card sets to which S responded correctly (Maximum score - 12) and this number is recorded on S's "Fluid" score sheet in IPAT Classification column.

MINIATURE SITUATIONS TEST

(used by the express permission of Dr.
Sebastian Santestephano, Clark University)

Those MST items marked "Research" may be deleted. They are not integrated into the current scoring, but show considerable promise and are being further investigated.

PRELIMINARY INSTRUCTIONS

E states, I AM GOING TO GIVE YOU TWO THINGS TO DO AND TELL YOU HOW EACH ONE WORKS. AFTER SHOWING YOU THE TWO THINGS, JUST PICK THE ONE YOU FEEL MOST LIKE DOING.

A -- Research MATERIALS - postal scale with inverted thumg tack, and plastic container, 18 bolts of 3 different colors.

E says, THIS GADGET (pointing) MEASURES HOW MUCH PAIN YOU CAN STAND WHEN YOU PRESS YOUR FINGER DOWN ON THIS TACK (demonstrate) NOW, YOU CAN EITHER SEE HOW MUCH PAIN YOU CAN STAND OR YOU CAN SEE HOW FAST YOU CAN SORT THESE THREE KINDS OF BOLTS INTO THREE PILES. SEE........PUT THIS KIND HERE, etc.

B -- MATERIALS - a pencil, sheet of geometric forms.

E says, HERE YOUR JOB IS TO HUNT FOR ALL OF THE CIRCLES AND SQUARES AND PUT A MARK ON THEM LIKE THIS (demonstrate with the 2 samples at top of page.) BEGIN HERE (pointing) WITH THIS ROW AND LOOK FOR CIRCLES AND SQUARES AND MARK THEM. THEN LOOK AT THIS ROW, etc..... SEE HOW MANY YOU CAN DO BEFORE I SAY "STOP". DO YOU UNDERSTAND?.... ....READY ....GO.

E times S's performance and stops S after first 4 lines. E then counts aloud the number of lines completed by S saying, YOU'VE GOT FOUR LINES LEFT TO DO. SO YOU ARE NOW HALFWAY. NOW, YOU CAN EITHER FINISH CROSSING OUT THE REST OF THE CIRCLES AND SQUARES WHILE I TIME YOU, OR YOU CAN START SOMETHING ELSE. Present next situation if S does not wish to continue.

C -- Card sorting: timing vs. being timed.

MATERIALS - cards, shuffled deck of red and blue cards, stop watch.

THIS TIME YOU CAN USE THIS STOPWATCH TO TIME ME TO SEE HOW FAST I CAN SORT THESE BLUE AND RED CARDS INTO A RED AND BLUE PILES OR I CAN TIME YOU TO SEE HOW FAST YOU CAN DO IT. WHICH WOULD YOU LIKE TO DO?

D -- Easy Game vs. Hard Game.

THE NEXT THING HAS A HARD PART AND AN EASY PART. WHICH WOULD YOU LIKE TO DO? It is frequent for S's with this situation to want to know the nature of the activity before making their choices. E should then note that he would like the S to make his choices before knowing what the activity is about.

After S makes his choice, E administers the block design (Test E) if easy response was made and (Test H) if hard response was made.

THESE BLOCKS HAVE DIFFERENT COLORED SIDES SOME RED, SOME WHITE, AND SOME HALF AND HALF. THEY CAN BE PUT TOGETHER TO MAKE DESIGNS LIKE THIS (presenting appropriate stimulus card).

S is timed while performing task, but assistance may be extended if needed as there is need to reinforce failure feelings.

E -- Breaking Balloon vs. Examining Strange Object.
Research

MATERIALS - Blown up balloon, pin and dissembled syringe components.

THIS TIME YOU CAN EITHER BREAK THIS BALLOON WITH THIS NEEDLE OR LOOK THIS GADGET OVER AND SEE WHAT IT'S ALL ABOUT. WHICH WOULD YOU LIKE TO DO? (obscure syringe components with your hand after S has had one brief glance.)

F -- Being Bound vs. Bandaged.

MATERIALS - Sash cord, band-aid.

NOW THIS TIME YOU CAN EITHER HAVE ME TIE YOUR WRIST TOGETHER WITH THIS ROPE OR LET ME PUT THIS BAND-AID ON YOU. WHICH WOULD YOU LIKE? Be sure to put the band-aid over the S's knuckles, saying, I'LL PUT IT ON YOUR KNUCKLES SO YOU CAN TAKE IT OFF WHENEVER YOU WISH.

G -- Examining Box Interior vs. Looking at Picture.

MATERIALS - Empty Box, picture.

Present box gingerly as if not to shake contents; guard against premature exploration. NOW, ONE THING YOU CAN DO IS, WITHOUT LOOKING, PUT YOUR HAND INTO THIS BOX AND FEEL AROUND TO SEE WHAT'S IN THERE. THE OTHER IS THAT YOU MAY LOOK AT THE PICTURE INSIDE THIS FOLDER. WHICH WOULD YOU LIKE TO DO?

TRANSPORT ILLUSION (Piaget)

MATERIALS

Field board with fixed 50mm. standard; 2 groups of stimuli varying from 43 mm. to 53 mm. with both a numerical and an alphabetical designation on reverse side; recording sheet.

PROCEDURE

Present the field board with the first stimulus in the "Near" condition (adjacent and contacting standard and base strip), stating, HERE ARE TWO LINES. WHICH ONE IS LONGER? Record the S's choices on the recording sheet as either S (standard) or P (presented) stimulus.

Be sure in the "far" condition to draw subjects attention directly to both the stimulus and the presented lines by distinctly pointing to each.

If S states that they are equal, record it but continue by saying, ONE OF THE LINES IS LONGER THAN THE OTHER. LOOK CAREFULLY, AND TELL ME WHICH ONE YOU WOULD GUESS IS LONGER. Record this forced choice (If S calls the 50 mm. presented stimulus....11A....as equal, allow it.) E should perfect an effortless technique for keeping the stimuli in order and presenting them without undue distraction or delay.

ORDER

1 - Near

A. Present 1 - 5 (red numerals) in the Near condition. If any are missed (mis-perception of any lines other than G - 5, I - 3, which may be called either "larger" or "smaller" without penalty), then continue with 6 thru 11 (In blue numerals) in the Near condition.

A - Far

B. When (A) is completed, present A - E (red letters) in the Far condition (at the opposite side of the board abutting side and base strips). If any misses occur, (except for A - 11, which can be called either), continue with F thru J (blue letters) before proceeding to the next test.

Be sure to keep the standard board and stimulus tabs clear of pencil marks, etc.

SCORING

There is a weight (or loading) for each level of response as a function of how distant it is from correct response. Each incorrect response is multiplied by this loading, and all products are summed for the Transport Score.

SITUATION INSIGHT

MATERIALS

Pictures protraying social situations, recording blanks.

PROCEDURE

Present picture A, saying, TELL ME WHAT IS HAPPENING IN THIS PICTURE? If S is slow and hesitant-appearing, helpfully encourage by saying further, WHAT DOES IT LOOK LIKE IS GOING ON IN THIS PICTURE?

If S's response lacks scorable insight after 20 seconds, query S with, ANYTHING ELSE? only once on each picture. Be sure to record verbatim both on the S's responses and the E's re-questioning.

SCORING SCALE

Sum the scores of the four pictures, and record this total score on S's "Fluid" score sheet by circling the number in the "Situation insight" column.

Each item is rated as follows:

1 - Seen as parallel people..........description of physical surroundings...obscure, situation related....no insight shown, even with query.

Example - "This man showing them this stuff-sorta boxes and stuff, look like, and that boy sweeping up the floor (anything else?) We got a desk back there and a file cabinet back of them."

2 - Some correct insight and situational relationship seen between people...........insight gained with query.

Example - "Well he can't open the door, he got the boxes there." (anything else?) "And the guy 'pose to open door, sitting down."

3 - Spontaneous insight shown.......no questioning necessary, except for purposes of clarification.

Example - "He's having telephone only he can't hear because this guy making noise so he can't hear."

KNOX CUBES (Modified)

MATERIALS

5-cube tapping blox, recording form,
2 pencils (for tapping)

PROCEDURE

Hand S a pencil, saying, I AM GOING TO TAP THESE BLOCKS IN A CERTAIN WAY. WATCH HOW I DO IT VERY CAREFULLY. WHEN I AM FINISHED, YOU TAP THEM IN THE SAME WAY.

Then proceed to tap blocks in sequence "A" on record form at a slow deliberate rate of one tap/second. The numbers refer to block positions, counting from the left, e.g. 1-2-3-4-5. After each successful performance, proceed to next sequence (as B, C, D, E, F). When S fails a sequence, re-administer the same sequence, treating it as if it was a new item. If S misses on this second trial, administer only once more for the third trial, then continue on to the next sequence regardless of S's performance.

SCORING

On each of the six tapping tests, one of four possible scores is given, according to the number of trials necessary for S to respond with the correct tapping sequence. Scoring is as follows:

1 if correct on the 1st trial;
½ if correct on the 2nd trial;
1/3 if correct on the 3rd trial.
0 if all three trials were unsuccessful.

The sum of these six tapping tests should then be entered on S's "Motor" score sheet.

TIME ESTIMATION

MATERIALS

Stop watch, holder, recording sheet. E places watch in holder so that the start-stop button protudes at top with watch facing E.

PROCEDURE

THIS TIME I WANT YOU TO GUESS HOW LONG TEN SECONDS IS. HERE IS A STOP WATCH. I WILL START IT BY PRESSING DOWN ON THIS BUTTON (poing but do not start watch) THEN, YOU WAIT UNTIL YOU THINK TEN SECONDS HAVE PASSED AND THEN STOP THE WATCH BY PUSHING THE SAME BUTTON......OK? (If S appears unclear, repeat with demonstration without showing watch face to S.) Administer five trials at this level. Record each trial to the nearest fraction of a second. (S should be cautioned to push harder if watch is not stopped.) Some subjects will sit endlessly without responding. If they go to the 90 seconds for the first two times (Having been terminated by the E at 90 seconds with the statement: NOW LET'S DO IT AGAIN. NOW, REMEMBER, YOU STOP THE WATCH WHEN YOU THINK TEN SECONDS HAVE PASSED AFTER I STARTED IT) then skip the next three trials and go directly to the Standard trial, and following five trials. (see below)

E should avoid eye contact or distracting behavior once the stop watch is started as this introduces unconscious cues.

STANDARD TRIAL

After fifth trial, E removes the watch from the holder and shows the face to S, saying, NOW, IF YOU WILL WATCH CAREFULLY, I WILL SHOW YOU EXACTLY HOW LONG TEN SECONDS IS, E holds pencil at ten second point, presses stem, and stop watch hand at ten seconds, then replaces it in the holder. The E then says, NOW, LET'S DO IT AGAIN. I'LL PUSH THE BUTTON, WHEN YOU THINK TEN SECONDS HAVE PASSED, THEN STOP THE WATCH AS BEFORE. Administer five trials at this level.

SCORING

The absolute time estimation for the first and second sequences are added separately. If a total is between 30½ - 56 secs., it is given a weighted loading of 2. All other times, larger and smaller, are given a weighted loading of 1.

The weighted loadings of both sequences are multiplied together to produce the Time Estimation score.

MEDIUM TAPPING (Wrist Speed)

MATERIALS

Printed forms, stop watch.

PROCEDURE

With presentation of printed forms, E says, TAKE THE PENCIL AND PUT THREE DOTS IN EACH CIRCLE. WHEN I SAY, "GO", DOT AS MANY OF THE CIRCLES AS YOU CAN. REMEMBER, ONLY THREE DOTS IN EACH CIRCLE. GO AS FAST AS YOU CAN AND DON'T STOP UNTIL I TELL YOU.........OK? ..............READY..........GO.

This first trial is 15 seconds long. Then reverse the page, saying, LET'S TRY IT AGAIN. This second trial is also 15 seconds long.

If S does not dot exactly three per circle, point it out to him only one time.

SCORING

The total number of circles accurately tapped should be recorded on S's "Motor" score sheet by circling the appropriate number in the "Tap" column. If the total is a number equidistant from two printed numbers, the space between should be circled.

CONSERVATION (Piaget)

MATERIALS

A - Conservation of Substance:
2 pieces of clay, recording form.

B - Conservation of Weight:
same 2 pieces of clay, same recording form.

C - Seriation:
a series of 5 graduated figures (2 additional),
5 graduated sticks, same recording form.

D - Conservation of Number:
8 red poker chips, 16 blue chips, same recording form.

NOTE - The recording form for these sub-tests contains the necessary probing questions procedure, which must be carefully followed.

PROCEDURE

S is first given Conservation of Substance, then Conservation of Weight. If S misses both critical questions on the Conservation of Substance (only), the S must be given Conservation of Number and Seriation in that order. If S got one of the two critical questions in Conservation of Substance, then the latter two tests are dispensed with. (It might be helpful to observe that clay becomes sticky with continued manipulation; this can be minimized by alternating the balls.)

SCORING (see following page)

If conservation of substance score is $\geq$ 5, then add the weight score times nine plus the substance score times nine, i.e. (Wt. X 9) + (Sub. X 9).

If conservation of substance is $<$5, and seriation is $\geq$ 5, then add conservation of weight score times three plus the substance score times three, plus seriation score times 3. (Wt. X 3) + (Sub. X 3) + (Seri. X 3)

If conservation of substance is $<$5, and seriation is $\leq$5, then add the actual weight, substance, seriation and conservation of number scores, Wt. + Sub. + Seriation + Number.

The Recording sheet has appropriate blanks to facilitate computing the overall scale score.

SCORING

Score is a function of comparing subjects responses to the following scaled responses.

SUBSTANCE	WEIGHT	SERIATION	NUMBER
10 No problem, good explan., logical: "You didn't take anything away and therefore.	Similar to substance, 10	10 Excellent, no errors	Excellent, no errors. "Just further apart, didn't add or take away."
9 No problem, fair explan., unclear: "Make this back into a ball, and it will be the same; you just rolled it out."	Similar to substance, 9	9 Good, no errors but slow, needed repeating.	Good, justified only by count.
8 No problem, some hesitancy, poor explanation; percept., related often miss informed. "Maybe one looks bigger (but) (tho)................	Similar to substance, 8	8 Errors in reversal immediately self-corrected.	Fair, Miscount error corrected when re-asked, as if oversight. Unclear whether S has correspondence.
7 Missed 1, good logical explanation on correct 1.	Similar to substance, 7	7 Errors in reversing corrected on second try.	OK on 1, but had rationale on missed sequence.
6 Missed 1, fair explan. on correct 1.	Similar to substance, 6	6 Errors in reversing corrected on third try.	Missed 1, no correspondence initially.
5 Missed 1, poor explan. on correct 1, percept-related.	Similar to substance, 5	5 Errors in reversing not corrected by third try.	Missed 1, counted initially.
4 Missed both, got return to ball with good explan: "Both (return) had same by evening them up."	Similar to substance, 4	4 Errors in direct seriation self-corrected. Reversing errors not corrected.	Missed both, used correspondence on introductory matching.
3 Missed both, gets return-fair explan., percept., -related: "Got same amount of clay in it."	Similar to substance, 3	3 Errors in direct seriation corrected on second try.	Missed all, counted on introduction matching.
2 Missed both, gets return-unclear explanation: "Well its round, both rolled in a ball."	Similar to substance, 2	2 Direct Seriation errors corrected on third try.	Missed all, misperceived more of 1 color both times.
1 Missed both, missed return error logical tho perc-related compative: "Looks smaller (bigger); It's been worked with; Rounder-more than this	Same as substance number one "It was broke in pieces" (therefore can't be the same.)	1 Errors uncorrected in seriation.	No idea of equivalence. Gross errors in introductory matching.
Missed both, confused on			

WAIS - OBJECT ASSEMBLY

MATERIALS

Four kits, directions, stop watch, WAIS record form.

PROCEDURE

Manikin, Profile, Hand, and Elephant are presented in standard order. Say, IF THESE PIECES ARE PUT TOGETHER CORRECTLY, THEY WILL MAKE SOMETHING. GO AHEAD AND PUT THEM TOGETHER AS QUICKLY AS YOU CAN. Record time, number of correct junctures on WAIS blanks. The maximum time on the first two is 120 seconds; second two, 180 seconds.

Refer to WAIS Manual for comprehensive instructions.

SCORING

Use age-corrected tables (WAIS manual pages 101 - 110 to derive scale scores)

WAIS - DIGIT SYMBOL

MATERIALS

Pencil, stop watch, WAIS record form.

PROCEDURE

Place test form before S, saying, LOOK AT THESE BOXES, NOTICE THAT EACH HAS A NUMBER IN THE UPPER PART AND A MARK IN THE LOWER PART. EVERY NUMBER HAS A DIFFERENT MARK. NOW, LOOK HERE, (pointing to sample,) WHERE THE UPPER BOXES HAVE NUMBERS THE SQUARES BENEATH HAVE NO MARKS. YOU ARE TO PUT IN EACH OF THESE SQUARES THE MARK THAT SHOULD GO THERE, LIKE THIS (point to key, then to samples.)
HERE IS A 2, SO YOU WOULD PUT IN THIS MARK.
HERE IS A 1, SO YOU WOULD PUT IN THIS MARK.
HERE IS A 3, SO YOU WOULD PUT IN THIS MARK.

Write in the first 3 as demonstration, then give S a pencil and have him finish the remaining 7 sample items, saying, NOW YOU DO IT FOR THESE NUMBERS AS FAR AS THIS LINE.

If S is still confused, help him on sample items. Then point to squares following samples, saying, NOW WHEN I TELL YOU TO BEGIN, START HERE AND FILL IN AS MANY SQUARES AS YOU CAN WITHOUT SKIPPING ANY. GO ON TO THE NEXT LINE WHEN YOU FINISH THE FIRST. READY..............BEGIN.

Time - 90 seconds.

SCORING

Use age-corrected tables (WAIS manual pages 101-110 to derive scale scores.

NAIL BOARD (Dexterity)

MATERIALS

Nail board, 144 nails, recording form, stop watch.

PROCEDURE

Presenting board, say, TAKE THESE NAILS AND PUT THEM IN THESE HOLES WHEN I SAY "GO". START HERE (pointing to upper left for right-handed S's) AND WORK ACROSS. WHEN YOU FINISH A ROW START OVER ON THE NEXT ROW BELOW AND WORK ACROSS AGAIN. WORK AS QUICKLY AS YOU CAN. DON'T STOP UNTIL I TELL YOU. YOU MAY USE BOTH HANDS.
READY................GO.

Record the number done in 5 minutes, or the time when S completed task if done in less than 5 minutes.

SCORING

Count the total number of holes completed and record on the S's "Motor" score sheet by circling the number in the "Dext" column. If all 144 nails are put in before 5 minutes, pro-rate it by the following formula:

$$\frac{720}{\text{number of minutes.}} = X$$

Record the X -value as the score.

FOUR WORD SENTENCES

MATERIALS

List of stimulus words.

PROCEDURE

THIS TIME I AM GOING TO SAY FOUR WORDS. YOUR JOB IS TO PUT THESE FOUR WORDS INTO A SENTENCE. YOU CAN USE AS MANY OTHER WORDS AS YOU LIKE IN MAKING A SENTENCE, BUT TRY TO USE THESE FOUR WORDS IN PARTICULAR. THE FIRST FOUR WORDS ARE: BILL, APPLE, GREEN, ATE. CAN YOU MAKE A SENTENCE USING THESE WORDS.......BILL, APPLE, GREEN, ATE? Be sure to pronounce these sample words slightly slower. If the S blocks for 15 seconds, repeat the above sentence (FOR INSTANCE.......) Also, do only the odd numbered sentences.

If S blocks on a group, encourage him briefly but do not dwell on it; proceed smoothly. The following criteria constitutes a failure.

a.) S repeats only stimulus words,
b.) S uses only one stimulus word,
c.) S uses each stimulus word in a separate sentence.

Discontinue questioning after two successive failures.

SCORING

Each of the five word sets should be given a numerical score in accordance with the scoring criteria. These scores should then be summed and the total score recorded on S's "Fluid" score sheet by circling the appropriate number in the "4-Word Sentence" column.

12	Well integrated, meaningful sentence
11	Incomplete or slightly garbled
10	Two well integrated, meaningful clauses
9	Two fairly integrated clauses, less meaningful
8	Two poorly integrated, meaningful clauses
7	Two poorly integrated clauses, less meaningful
6	More than two clauses; meaningful
5	Less than two clauses, meaningful
4	More than two clauses; poorly related, little meaning
3	As in 4, but relatively meaningless
2	Separate sentence for each word
1	Separate garbled sentence for each word
0	No response, words repeated without meaning, word salad.

FOUR WORD SENTENCES continued

Loadings

1.00 if all four words are used
.75 if three words are used
.50 if two words are used
.25 if only one word is used.

$$\text{Score} = \frac{(\text{Sentence rating}) \text{ X } (\text{Number of Stimulus Words That Are Used})}{4}$$

AIMING (Finger)

MATERIALS

Printed form (reverse side of Tapping Form; small circles), stop watch.

PROCEDURE

After presenting form and readying stop watch, say, TAKE YOUR PENCIL AND PUT ONE DOT INTO AS MANY OF THE CIRCLES AS YOU CAN ON THIS SHEET. REMEMBER, WORK AS FAST AS YOU CAN AND PUT ONLY ONE DOT INTO EACH CIRCLE. DO NOT STOP UNTIL I TELL YOU. READY............GO.

Administer two trials of 30 second duration each one at the top of, the other at the bottom of the page. Rotate the page.

SCORING

The number of correctly dotted circles should be recorded for each of the two trials, the total of these two sums should then be circled and recorded on S's "Motor" score sheet by circling the appropriate number in the "Aim" column.

IPAT WRONG PICTURES

MATERIALS

IPAT recording form 1.

PROCEDURE

After presenting form, say, THE MAN WHO DREW THESE PICTURES DREW SOMETHING WRONG IN SOME OF THEM. I WANT YOU TO LOOK AT THEM CAREFULLY AND TELL ME WHAT HE DID WRONG. LOOK AT THE LITTLE BOY. WHAT IS THERE SILLY ABOUT THAT? If S hesitates, say, POINT TO WHAT YOU THINK IS WRONG.

E then proceed S to each picture in turn, asking, CAN YOU SEE ANYTHING WRONG IN THAT?

About 15 seconds should be the limit for each picture, after which----if no answer is forthcoming----S should be invited to the next picture.

When a unclear answer is given, as in #9, that the sandals have "too many holes in them," E then should encourage further, saying, ANYTHING ELSE? Retarded S often indicate the sandals are on "wrong feet" or reversed. No credit is given unless they realize only 1 shoe is wrong.

Partial answers should not be accepted; question further without suggestiveness. HOW SHOULD IT BE? Be sure to use a separate recording form for S's responses.

SCORING

On each of the twelve items, a score of 1 is given for a correct response and an 0 score is given for an incorrect response. The sum of these twelve scores should be recorded on S's "Fluid" score sheet by circling the appropriate total score.

TRANSPORT (Piaget)

MATERIALS

Same as sub - test 3.

PURPOSE

To remind the E of the second half of the counter-balanced presentations.

PROCEDURE

Say, THIS TIME WE WILL DO SOMETHING THAT WE DID BEFORE. REMEMBER, TO LOOK AT BOTH LINES AS CAREFULLY AS YOU CAN. Use a bottom $\frac{1}{2}$ of test 3 recording form for this test.

ORDER

The only major difference between this and sub - test 3 is the inversion of the order of presentation sequence.

1 - Far	The FAR condition is administered first with stimuli. 1 - 5 (red numerals.) If the S judges wrongly one of this group, (except for standard 3-5-11) then 6 to 11 are added (Miss as defined before).
A - Near	Following this, the NEAR condition is presented utilizing stimuli. A - E. Stimuli F - J are employed only if a significant miss is recorded in A - E.

SCORING

On the record sheet one of the center columns is headed "load". These are the score loadings for incorrect judgments. They are loaded so that the more extreme incorrect judgments receive the heavier loadings. The total transport score is the sum of loadings, one for each incorrect judgment at any time.

WRITTEN ARITHMETIC

MATERIALS

Wide Range Achievement Test, (Part 1 thru 4 only,) pencil.

PROCEDURE

Before presenting material, say, THIS TIME I AM GOING TO LET YOU WORK WITH SOME NUMBERS. BE SURE TO LOOK ALL OF THE NUMBERS OVER CAREFULLY. YOU CAN TAKE AS MUCH TIME AS YOU NEED. WORK AS MANY OF THE ONES YOU CAN FIRST BUT DO NOT SPEND TOO MUCH TIME ON THE HARD ONES. (Emphasize this difference from "school tests" if S indicates anxiety.)

NOTE It is most important to avoid anxiety - arousing associations. This may be facilitated by a calm indifference on the part of the E. Suggestions include avoid watching the S work and E can begin picking up previous test materials while the S works. Also avoid placating statements such as, JUST DO THE BEST YOU CAN, THAT'S ALL ANYBODY CAN, ISN'T IT? etc.

Do only the first four math areas (addition through division.)

SCORING

The following scoring system is to be used:
Correct problems are scored as follows
(Sequential across page.):

1. Addition	2	2	2	2	1	1	1
2. Subtraction	1	1	1	1	1	6	6
3. Multiplication	1	1	1	1	6	6	6
4. Division	1	1	6	25	25	25	25

The sum of these four section scores is the total test score, which should be recorded on the S's "Fluid" score sheet by circling the appropriate number in the "Writ. Arithmetic" column.

SCORING COMPILATION, JOB SUCCESS PREDICTION AND INTERPRETATION

SCORING COMPILATION

Each test score on Record Sheet 1 is derived by appropriate operations (judging, transformations, etc.) and all sub-scores added; resulting score for each test score is recorded in the boxed space for each test on Record Sheet 1, and

Transferred to appropriate column on either the MOTOR or FLUID side of the Scale Scoring Sheet. (except for the score values of the A-Scale, H-Scale, Time Estimation, and Transport, all of which go directly on the PROFILE SHEET.)

Tests 4, 7, 13, 11, 10, and 5 are represented on the Motor Scale.

Tests 14, 9, 8, 16, 1, 12 are represented on the Fluid or Reasoning Scale.

On the Scale Scoring Sheet, each test score is recorded at the appropriate value in the column of values below its test heading. The scale score for each test score is discovered by looking to either edge of the sheet for the scale value opposite each individual test score. These scale values are recorded on the right edge at each side.

When all the scale values have been found, they are summed. (The Motor values undergo a further transformation, a multiplication of 7/6.)

These last values are then transferred to the "Motor" and "Fluid" columns of the Profile Sheet.

TO DERIVE THE JOB SUCCESS PREDICTION

On the left hand of the Profile Sheet, the Fluid Score, Motor Score, A-Scale, and H-Scale values are entered in the appropriate blanks, and added as indicated (the first two becoming the Aptitude Score and the last two the "Personality" score.)

The Profile Sheet is then turned over, and the coordinates of this same Aptitude Score (vertical dimension) and the Personality score (horiz. dimension) are located.

It will be seen that these coordinates fall between values bands labelled with fractions. These fractions are the probability values for the job success in competitive circumstances of subjects whose coordinates fall along them.

INTERPRETATION

Job Success

The probability of Job Success is based upon a sampling of educable retardates with at least two years of job "exposure". There were as follows:

Worked successfully for over 1 yr: 14
Worked successfully so far, but less than 1 year: 19
Failures: 12

15 subjects working in circumstances independently rated "protective" were not used in this standardization.

Profile Sheet

The Profile Sheet reflects relative strengths and weaknesses in comparison to data from 60 unselected educable retardates.

Its utilization in cases of low predicted job success for singling out areas for special emphasis in remediation and re-training is now under investigation at Laradon Hall.

In general, ratings falling within the shaded areas are minimally acceptable; above are excellent, below indicates distinct deficit. Interpretation of individual scales are as follows:

A-Scale: Adventurousness, the tendency to approach threatening circumstances. Good for job success.

H-Scale: An empirical item that tends to single out "disorganizing tensions", seems to cull out highly hostile subjects, and those with a mental hospital history.

Fluid Scale: An empirical scale that tends to be represented by reasoning tests, which are not highly characterized by specific experiential education except for arithmetic. In that case, it does raise some quesions regarding the limitation of arithmetic instruction with educable retardates.

Motor Scale: Characterized by motor speed tests, tests involving recent visual memory, and picture interpretation test.

APPENDIX B

Forms and novel tests used in the project

JEFFERSON COUNTY PUBLIC SCHOOLS
Administration Building
1580 Yarrow Street
Lakewood, Colorado

A study under the Office of Vocational Rehabilitation, United States Department of Health, Education, and Welfare is being conducted on young people who are not continuing their education and who are presently employed or who have been employed since having left school.

Individuals who participate in the study will be asked to:

(a) Permit a member of the research staff to come to your home to talk briefly with the parent and/or the youngster. The questions asked would pertain to the youngster's job experience, if she or he has had some employment.

(b) Permit the youngster to come to Laradon Hall Occupational Center, East 51st and Lincoln Street, Denver, to take some aptitude and psychological tests administered by the research staff. The tests will require three appointments, each lasting approximately 2 to 3 hours. The Research Project, 987 will give the individual $5.00 upon completion of the series of tests in order to help compensate for their time and effort.

(c) All interviews and testing will be arranged at a time which is convenient for all individuals involved. If the youngster is employed, appointments will be made so as not to interfere with the person's work schedule.

The names of all individuals participating in this study will be kept confidential and will not be written into the final report.

If you wish to have your youngster participate in this study, please sign the enclosed authorization form and return it in the stamped self-addressed envelope.

At this point, the research project is primarily concerned with individuals who have work histories. Therefore, if your son or daughter has not had any job experience please check the appropriate box on the authorization form and return the form. No further contact will be made if the youngster has not had any job experience.

We of Jefferson County Public Schools recommend that you participate in the study, as we feel this research is important and could help thousands of youngsters.

Sincerely yours,

____

AUTHORIZATION TO PARTICIPATE IN STUDY ON VOCATIONAL SUCCESS

I hereby give my consent to the Staff of U.S. Office of Vocational Rehabilitation Research Project RD-987 to include ______________________
Name

as a participant in the study on vocational success being conducted by Laradon Hall Occupational Center.

____
Date

____
Signature of Parent, Guardian or Individual (if over 21 years of age)

____
Address

____
Telephone Number

Please check, if appropriate

_______ My son or daughter has not had any job experience since leaving school.

LARADON HALL EMPLOYMENT RECORD

Name________________________________Age_____ Sex______Date__________

Place tested_____________________________Date tested________________

1. Is the person named above now working?

2. If he is not working has he worked at any time since the date of testing given above?

   (If there is no work history since testing no further information is needed and this form may be considered complete. If the person is working now or did work since testing, answer the following questions only as they pertain to his most recent employment.)

3. Place of employment:

4. Method used in obtaining employment: (circle one)

   a. The job was arranged for him through the services of an agency or through parental or other community effort.

   b. The job was obtained through his own efforts.

5. Is this employer an agency for handicapped people or a sheltered workshop?

6. Is the employer a relative, neighbor, or friend of the family?

7. Did the employer know this person had a handicap at the time of hiring?

8. Wages or salary:

9. Length of time on job: (Give dates where possible)

10. How protective is this person's work situation? (circle one)

   a. He cannot be fired no matter how poorly he does; he is allowed to work at his own rate of speed on minor tasks.

   b. He is instructed in certain tasks but he is not required to do them completely or well.

   c. He is taught routine jobs but termination is considered only if he is totally incapable of performing the job or is socially immature, disruptive, etc.

   d. He must eventually perform at above 50 percent of normal standards but the employer is tolerant as long as progress toward this level is being made.

   e. Performance on the job is compared to standards set for normal persons.

   f. The job is unusually competitive and has a high failure rate even among normals.

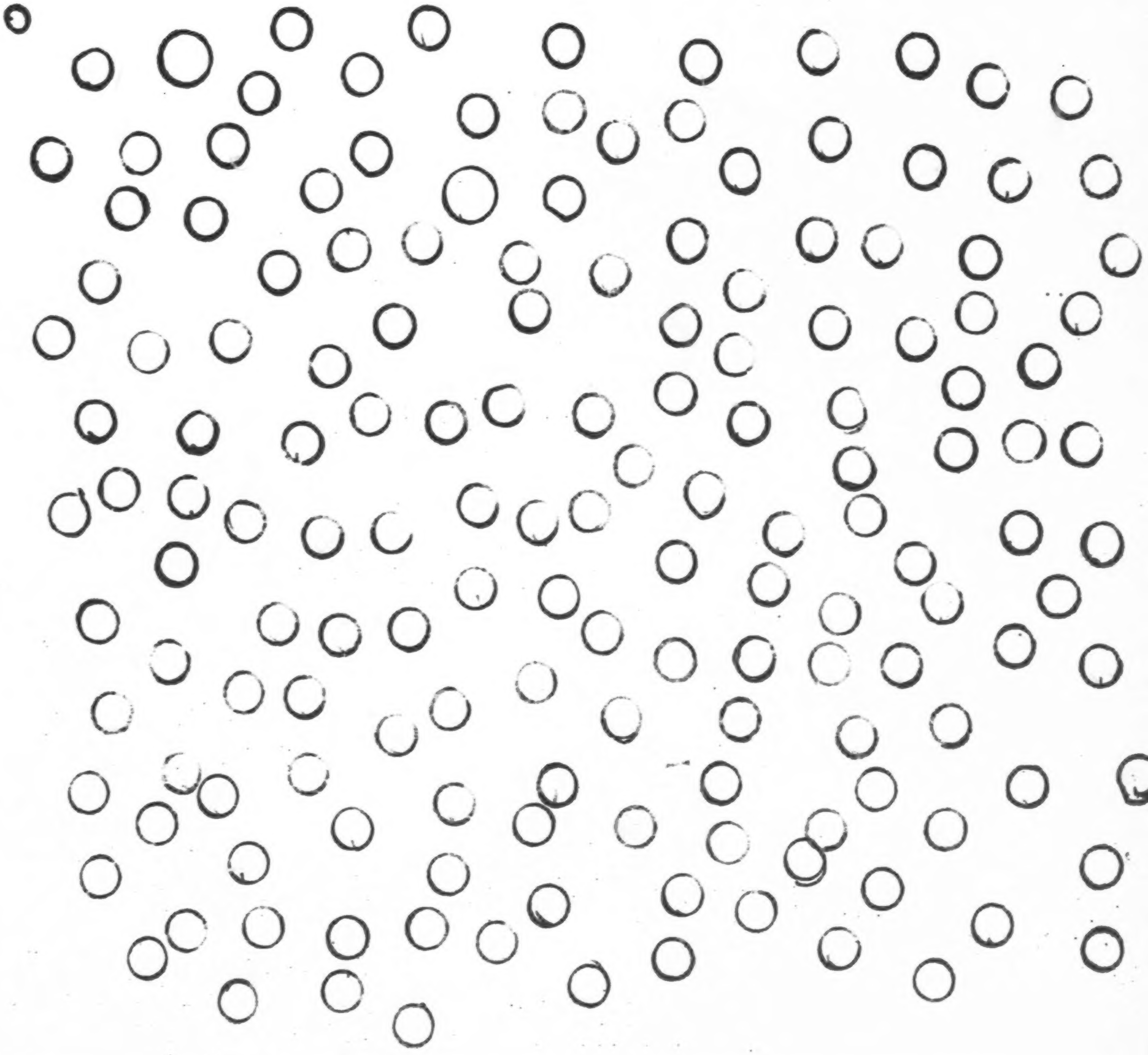
   (Answer question 11 only if the person is now employed. Answer question 12 only if his employment has now been terminated.)

11. Are the chances good that this person will still be employed at this same position three months from now? If not, why not?

12. What were the reasons for this person's employment being terminated? (Please include as many reasons as you think relevant, in order of importance.)

Person completing form________________________ Position________________________

FINGER AIMING **NAME**______________________ DATE______



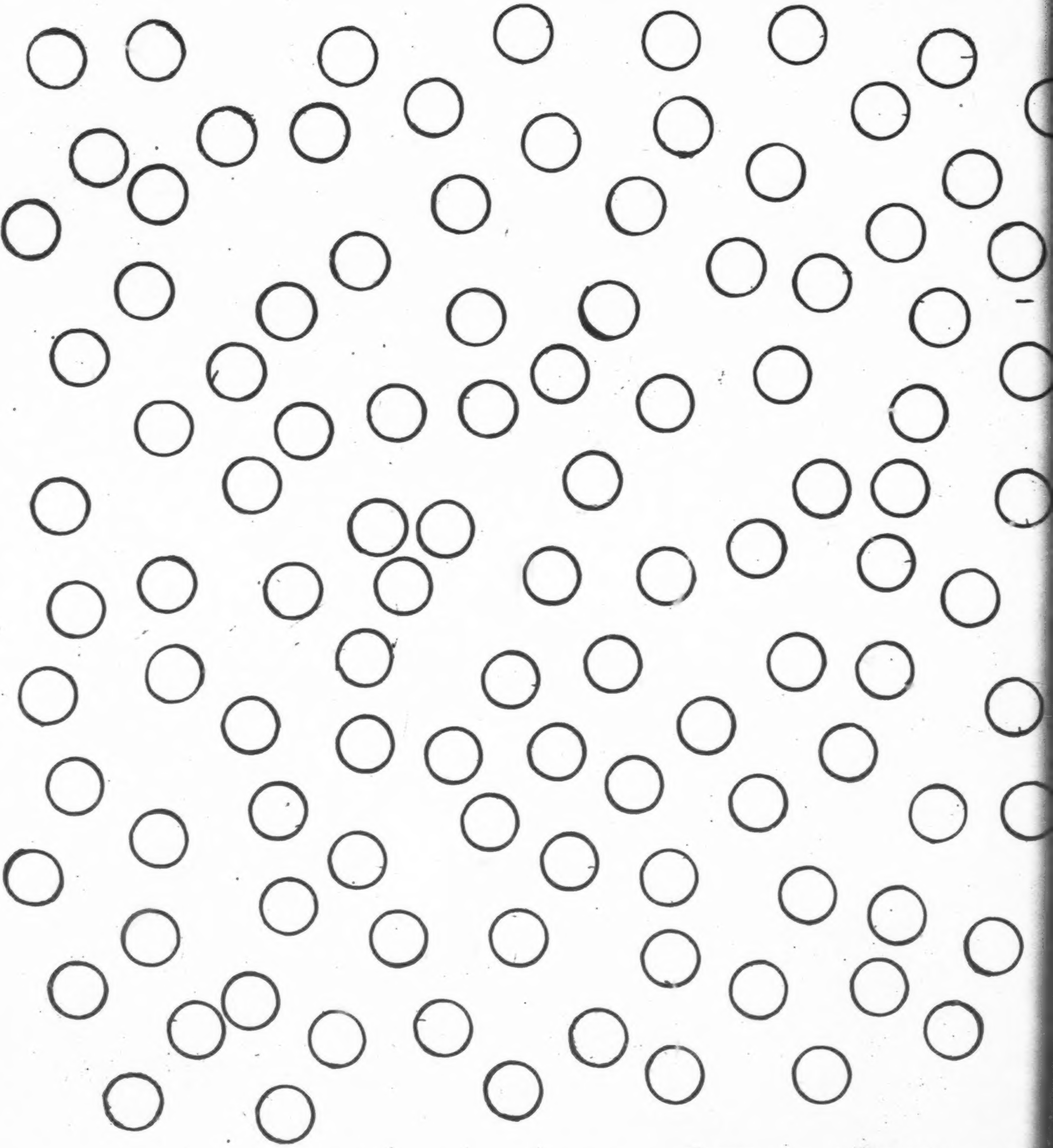
SCORE: TOTAL CORRECT IN 15 SECONDS

____

ERRORS

____

Wrist Speed Name ________ Date ________



Score_____ Errors______

LARADON PICTURE TEST

Recording Sheet

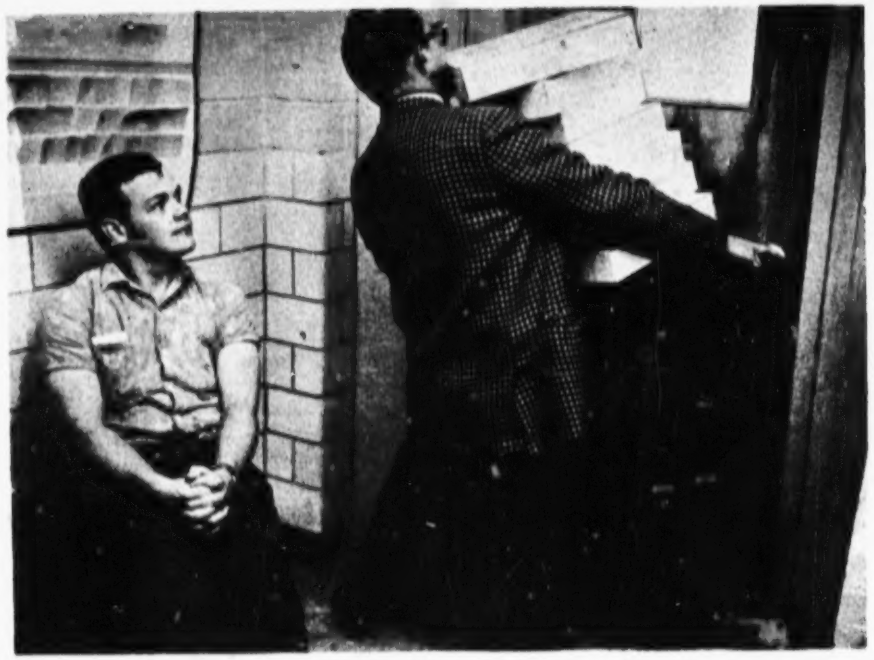
Record S's response verbatum. Refer to score sheet for scoring criterion.

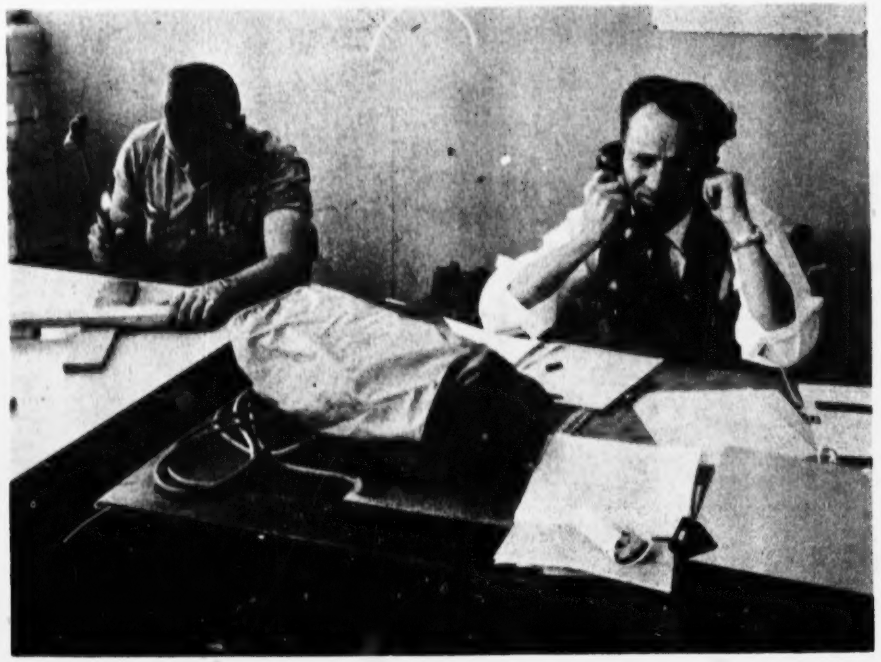
Picture 1

Picture 2

Picture 3

Picture 4





NO._____________________________ PIAGET BATTERY - 5

1. Transport Illusion: Near-Far (a) Record sheets

2. Circle Illusion: Straight-Concentric (a) Record sheet

3. Class Inclusion: Wooden-white (a) Record sheet

4. Entangled Figs: Notable Behavior

All OK. Not OK.

5. Entrecroisse: 1-C 2-D 3-B 4-G,K 5-H,J 6-E,F 7A 8-M 9-N 10-L
Minor error -1; major error is failed.

6. Haptic-Drawing

(incl. cross, swastika)	Circle	Square	Diamond	Line Crs	6-pt Star	Solid Crs	Swast
Haptic-Recognition							
Tachist.-Drawing							
Tachist.-Recogn.							
Stimulus-Drawing							

7. Classification: HERE WE HAVE SOME PIECES OF PLASTIC. PUT THOSE TOGETHER THAT GO TOGETHER.
   (a) Record sequences and nature of groupings.

   (b) When S. groups them only according to color or shape, ask him GOOD. CAN YOU NOW PUT THEM TOGETHER IN ANOTHER WAY. Record results likewise.

8. Conservation of Number: Give S a pile of blue chips to set out as E has set out his 8 chips ($\frac{1}{2}$ diam. apart) saying, NOW YOU SET OUT THE SAME NUMBER AS THERE ARE RED CHIPS (PUT OUT JUST AS MANY BLUE CHIPS AS THERE ARE RED CHIPS).
   (a) Record how S does it (by correspondence, counting, etc.)
   When finished, ask HOW DO YOU KNOW THERE IS THE SAME NUMBER OF EACH, HOW CAN YOU TELL?

   (b) Then spread out row of red chips (about $1\frac{1}{2}$ diams, apart) and ask NOW ARE THEY THE SAME? IS THERE THE SAME NUMBER OF EACH, OF RED AND BLUE, OR IS THERE MORE? (If S says they are different, ask WHERE?)...... HOW CAN YOU TELL?

   (c) Close up the row of red so each chip nearly touches the adjacent, making it shorter than this row of blue, and ask same questions as in (b).

9. Conservation of Substance: Take the two approximately equal balls of clay and say HERE ARE TWO BALLS OF CLAY. DOES ONE HAVE MORE CLAY THAN THE OTHER OR ARE THEY EQUAL. (Record Ss comment and actions.)

(If he finds them different, say TAKE SOME OFF THE BALL WITH MORE AND PUT IT ON THE BALL THAT HAS LESS.)
When S declares balls are identical, then take right ball and roll it into a 4" cylinder, saying the WHICH HAS THE MOST CLAY NOW?..........

WHY DO YOU SAY THAT?

Then roll it into a 15" cylinder and say WHICH HAS THE MOST CLAY NOW?.......

WHY DO YOU SAY THAT?

Then return the deformed back to a round ball and say WHICH HAS THE MOST CLAY NOW?

WHY DO YOU SAY THAT?

10. Conservation of weight: Take the two balls from #9 and put your fingers around the but leave them so they can be well seen and keep the balls on the table (this is to discourage the Ss picking them up later) and say NOW IF YOU WOULD WEIGH THESE TWO BALLS ON THE SCALES, WOULD THEY WEIGH DIFFERENTLY OR PRETTY NEAR THE SAME?

If S feels they weigh differently, say TAKE SOME OFF THE HEAVY BALL AND PUT IT ON THE LIGHT BALL UNTIL THEY LOOK LIKE THEY WOULD WEIGH ABOUT THE SAME. Do not allo S to pick up the balls for a trial feel (NO, DON'T PICK THEM UP. JUST LOOK AT TH TO SEE IF THEY LOOK LIKE THEY WOULD WEIGH THE SAME.)
When equalized, flatten the left one into a 4" pancake, and say WHICH ONE WOULD WEIGH MORE NOW?.......

WHY DO YOU SAY THAT?

Then break the pancake up into four quarters, which are piled up and say, WHICH ON
WOULD WEIGH MORE NOW? THIS BALL OR THIS PILE? (pointing)

WHY DO YOU SAY THAT?

Return deformed to ball shape and ask, WHICH BALL WOULD WEIGH MORE NOW?

11. Equilibrium Balance. HERE WE HAVE A BALANCE SCALE. IF I PUT THIS (single) WEIGHT OUT HERE (1ux 6), AND THIS ONE OUT HERE (keep on holding it w/betraying any force vector), WHAT DO YOU THINK WILL HAPPEN?

WHY DO YOU THINK...........?

NOW MAKE THEM SO THAT THEY WILL BALANCE? Record movements.

NOW THIS TIME I WILL PUT THIS (single) WEIGHT OUT HERE (1ux 18), AND YOU PUT THIS (single) WEIGHT ON THE OTHER SIDE WHERE IT WILL BALANCE IT. Record weights and movements again.

THIS TIME YOU PUT THIS (double) WEIGHT ON THE OTHER SIDE WHERE IT WILL BALANCE. (Record weight movements again). (Begin 1ux 18 each time.)

THIS TIME PUT THIS (triple) WEIGHT ON THE OTHER SIDE WHERE IT WILL BALANCE IT. Record again.

NOW IF I PUT THIS WEIGHT OUT HERE (4ux8), AND THIS WEIGHT OVER HERE (2ux16), THEY WILL BALANCE. NOW YOU CHANGE THEM AROUND SO THAT THEY WILL BALANCE LIKE THIS MOVING THIS ONE OVER HERE AND THAT ONE OVER THERE. Record.

HOW CAN YOU TELL WHERE THE WEIGHTS WILL BALANCE AHEAD OF TIME?

If necessary, WHAT IF YOU HAVE A WEIGHT LIKE THIS (4u) ON ONE SIDE AND ONE LIKE THIS ON THE OTHER (1u).

12. Seriation: Hand them 5 boy cut-outs, saying CAN YOU PUT THESE BOYS IN ORDER, THE BIGGEST FIRST, THEN THE ONE THAT'S A LITTLE BIT SMALLER, THEN GETTING SMALLER AND SMALLER UNTIL YOU COME TO THE SMALLEST? Record Ss ordering.

Hand them the group of sticks. NOW HERE ARE THE BOYS' STICKS. THE BIGGEST BOY HAS THE BIGGEST STICK, THE NEXT BIGGEST BOY HAS THE NEXT BIGGEST STICK, SO ON DOWN TO THE LITTLEST BOY WHO HAS THE LITTLEST STICK. FIND EACH BOY'S STICK AND PUT IT RIGH UNDER HIM. Record, and check by asking to find the stick for 2 or 3 selected boys.

If S cannot construct the series, do it for him when his inability has been conclusively determined.

Move the sticks close together so that the center stick is not directly under the center boy. NOW FIND THIS BOY'S STICK.........THIS BOY'S STICK.................
5-2-4-3-1

Then reverse the boys but keep sticks in same order but under the wrong boys. NOW WE'LL PUT THEM THIS WAY, BUT THE BIGGEST BOY STILL HAS THE BIGGEST STICK. THE NEXT TO BIGGEST BOY HAS THE........AND SO ON DOWN TO THE LITTLEST. NOW WHICH STIC DOES THIS BOY HAVE..........

5 2 4 3 1

NOW HERE COMES A NEW BOY. WHERE DOES HE FIT IN? Give them one-at-a-time from the alternate series, record where they are located.

5 4 3 2 1

13. PET test. I AM GOING TO SHOW YOU SOME PICTURES ONE AT A TIME AND I WANT YOU TO LOOK AT THEM AND TELL ME WHAT YOU SEE.

	I-TELL ME WHAT YOU SEE IN THIS PICTURE	II-SOMETIMES PEOPLE SEE SOMETHING ELSE BESIDES A____, DO YOU SEE ANYTHING ELSE?	III-(Limits) Sometimes PEOPLE SEE A____ DO YOU SEE A____
1. Giraffe-heart			
2. Vegetable-plane			
3. Scooter-candy			
4. Fruit-kangaroo			
5. Fruit-lady			
6. Fixtures-face			
7. Toys-face			
8. Tree-duck			
9. Leaf-faces			

	I-TELL ME WHAT YOU SEE IN THIS PICTURE	II-SOMETIMES PEOPLE SEE SOMETHING ELSE BESIDES A___, DO YOU SEE ANYTHING ELSE?	III-(Limits) SOMETIMES PEOPLE SEE A___ DO YOU SEE A___
10. Tree-faces			
11. Faces-vase			
12. Vases-face			
13. Staggered faces			
14. Ornate vase-faces			

14. Class Inclusion (Yellow-square) (b). Record on sheet

15. Circle Illusion (Concentric-straight) (b). Record on sheet

16. Transport Illusion (Far-near) (b). Record on sheet

17. Scale of Client Responsiveness Agressiveness Potential

HOW DO YOU FEEL WHEN PEOPLE MAKE FUN OF YOU? (DO YOU FEEL MORE SAD OR MORE MAD?)

0 1-S 2-more S 3-more M 4-M

HOW DO YOU FEEL WHEN BIGGER KIDS PUSH YOU AROUND?

0 1-S 2-more S 3-more M 4-M

HOW DO YOU FEEL WHEN YOU GET BAWLED OUT?

0 1-S 2-more S 3-more M 4-M

18. Moral Judgement

WHY IS IT WRONG TO TELL LIES?

WOULD IT BE ALL RIGHT TO TELL A LIE IF YOU DIDN'T GET CAUGHT AND IF NO ONE PUNISHED YOU FOR IT?

Stage 1: a lie is wrong because it is the object of punishment; if punishement wer removed, it would be allowable.
Stage 2: a lie becomes something wrong in itself and would remain so even if the punishment were removed.
Stage 3: a lie is wrong because it is in conflict with mutual trust and affection.

Name:

CLASS INCLUSION

Problem I - Material: 12 square, yellow, wooden beads
3 round, yellow, wooden beads

Show the subject the box of beads saying:
"You see these beads? Some are round (point), some are square (point), and they are all yellow."

a) "Now are the square beads yellow?"
b) "Are the round beads yellow?"

(If necessary correct any errors, making sure the subject understands
1. the initial premises in each section which are denoted by lower case letters)

A. "So then tell me, are there more yellow beads or more square beads?

B. "Why do you think so?"

(Stop and proceed to Problem II whenever the answers to the two final questions in any section are correct)

a) "Are all the beads square?"
b) "Are all the beads yellow?"
c) "If I took away all of the square beads would any be left? Which?"
d) "If I took away all of the yellow beads, would any be left?" (which?)

2. (Be sure and correct any misunderstandings.)

A. "So now what do you think? Are there more yellow beads or more square beads?"

B. "Why do you think so?"

a) "If I asked you to make a necklace out of all the square beads, show me which ones you would use. Put the beads you would use over here if I asked you to make a necklace out of all the square beads."

3. b) "Let's mix them up again, (do so), and if I asked you to make a necklace out of all the yellow beads, show me which ones you would use. Put the beads you would use over here, if I asked you to make a necklace out of all the yellow beads."

A. "Which necklace would be the longest? The one made out of the yellow beads or the one made out of the square beads?"

B. "Why do you think so?"

(If the answers to A & B are not correct, proceed to Problem II. If they are, ask questions (C) and (D):)

(C) "So, then, are there more yellow beads or more square beads?"
(D) "Why do you think so?"

a) "All of the beads are yellow, aren't they?"
b) "But they're not all square, are they?"

4. A. "So, are there more yellow beads or more square beads?"
B. "Why do you think so?"

(If the subject still gives the wrong answer, confront him with (C), (D), and (E).

(C) "But you said they were not all square?"
(D) "And they are all yellow?"
(E) "So how can there be more square beads than yellow beads?"

Problem II - Material: 19 green, wooden, round beads
9 red, wooden, round beads

Show the subject the box of beads saying:
"Here are some more beads. These are all made out of wood and some are painted green (point) and some are painted red (point)."

a. "So, tell me, are the green beads wooden, made out of wood?"
1. b. "And are the red beads wooden, made out of wood?"

A. "So then are there more wooden beads or more green beads?"
B. "Why do you think so?"

a. "If I made a necklace out of all the green beads, what color would it be?"
b. If I made a necklace out of all the wooden beads, what color would it be?"

2. A. "Which necklace would be the longest? The one made out of the wooden beads, or the one made out of the green beads?"
B. "Why do you think so?"

(Only if the answers to A and B are correct, ask questions C and D)

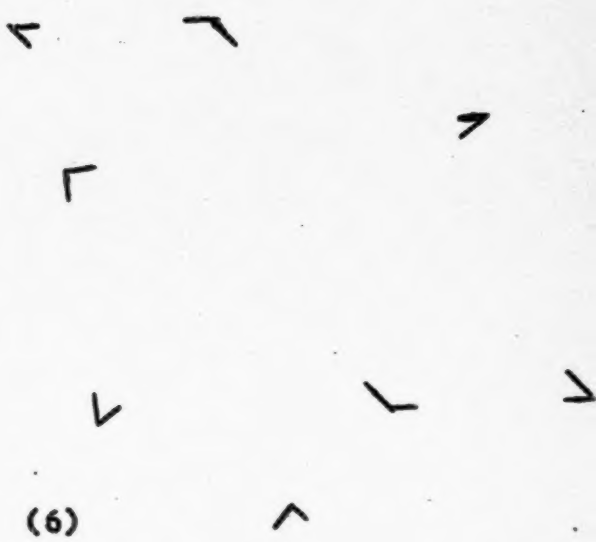
C. "So, are there more wooden beads or more green beads?"
D. "Why do you think so?"

Date: ______________________

ENTRECROISEE FIGURES
RECORDING SHEET

Name: ______________________

(1)



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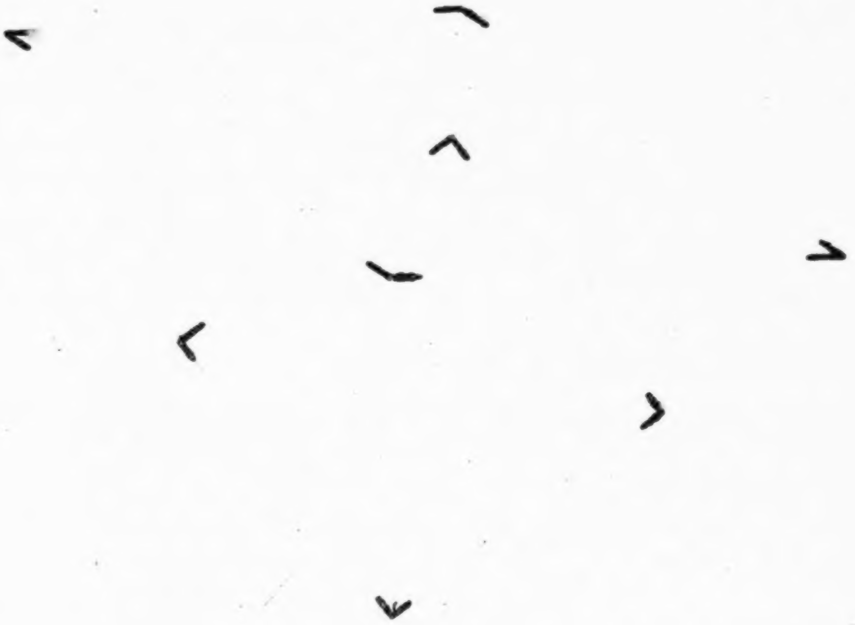

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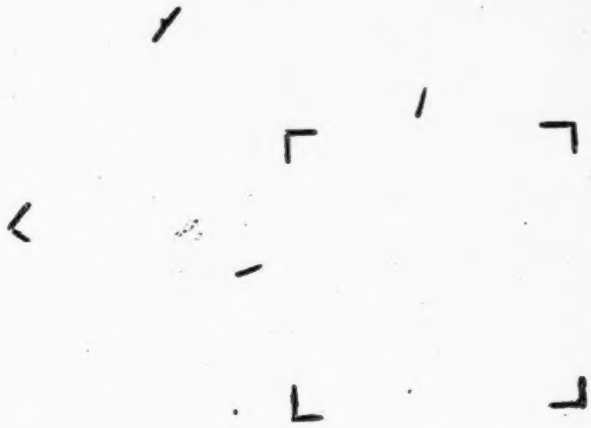

(5)